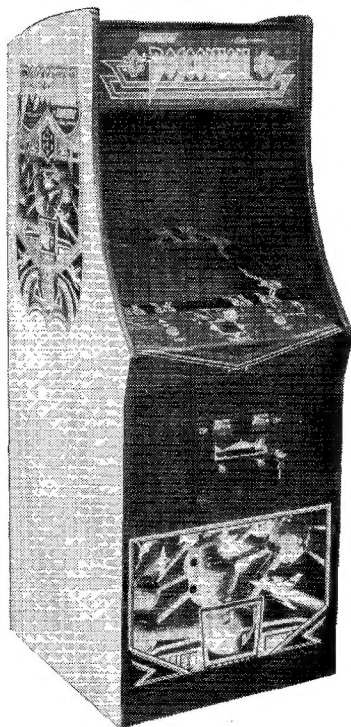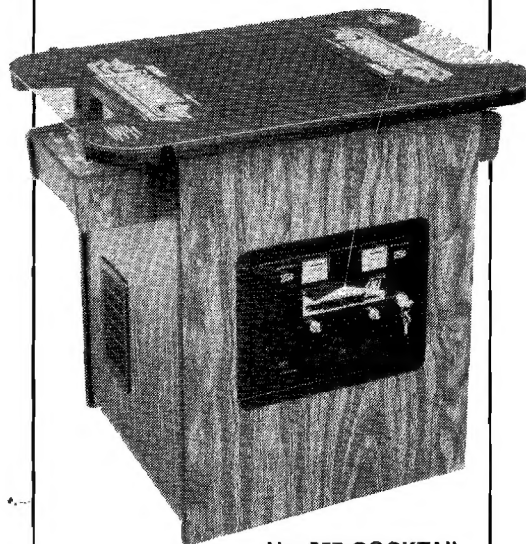*MIDWAYS*

BOSCONIAN

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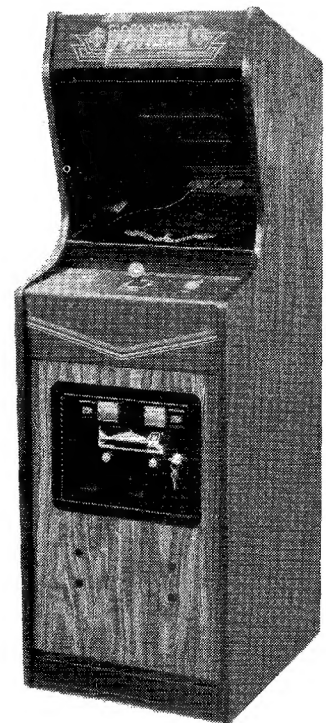
Parts and Operating Manual

No. 555 MINI

No. 557 COCKTAIL

No. 550 UPRIGHT

M *MIDWAY MFG. CO.*
A BALLY COMPANY

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

DESCRIPTION   **PAGE**

TABLE OF FIGURES

FIGURE   **PAGE**

Bosconian

I. Introduction

BOSCONIAN is a one or a two player game. There are three models: the "UPRIGHT", "MINI", and "COCKTAIL TABLE". When the two player mode is selected on the Upright or Mini model, the players take turns at the controls to fly their space fighter(s) through the game course. If you have purchased the Cocktail Table model of this game, the rules of play are the same. The only **difference** is that in the two player mode of the Cocktail Table game, the picture flips to face you when it's your turn.

When playing this game, you are the pilot of a space fighter stationed in deep space to defend your solar system against the on-coming BOSCONIAN conquerors and their space station worlds. Your mission is to destroy as many of the enemy ships and space stations as possible.

These invaders arrive in convoys. They will attack you and attempt to run into you while flying back and forth across the screen. They will engage your fighter either singly or in ATTACK FORMATIONS to defend their space station worlds from you. The BOSCONIAN space station worlds have several defences of their own to hinder you. They keep the areas around them filled with Cosmo-Mines, eject Space Mines when you approach, fire Missiles, and through a mysterious power, are able to attract Asteroids and keep them floating in their immediate vicinity.

Your space fighter is provided with a long range scanner which can pick up and track the BOSCONIAN home space station worlds and the Attack Formations they send out to destroy you. However, your scanner's sensitivity does not enable it to pick up and track single BOSCONIAN Ships, Missiles, Space Mines of any type, or Asteroids.

As your skill level increases, the number and direction of attackers coming at you at any one time and the speed with which they attack, is gradually increased; plus, their attack patterns become more and more complex while their aim gets better.

Bonus ships are awarded to you periodically throughout the game as you reach or pass certain preselected point values. Each enemy Ship, Missile, etc. has an assigned point value as listed in Figure 1.

Major New Features

Your BOSCONIAN game has several new features among which is the ability of your space fighter to fire both forward and backward at the same time, giving you greatly increased fire power, and the option to start a new game at the same level that your last fighter was destroyed.

Game Objective

The object of the game is to **HAVE FUN** and survive as long as possible while constantly improving your skills and destroying as many of the enemy as you can. As you do this, each following convoy of attackers will be harder to destroy.

OBJECT DESTROYED	POINT VALUE
ASTEROID	10 POINTS
COSMO-MINE	20 POINTS
I-TYPE MISSILE	50 POINTS
P-TYPE MISSILE	60 POINTS
E-TYPE MISSILE	70 POINTS
SPY SHIP	MYSTERY
CANNON ON ENEMY BASE SPACE STATION	200 POINTS
ENTIRE ENEMY BASE SPACE STATION	1500 POINTS
ENTIRE I-TYPE MISSILE ATTACK FORMATION	500 POINTS
ENTIRE P-TYPE MISSILE ATTACK FORMATION	1000 POINTS
ENTIRE E-TYPE MISSILE ATTACK FORMATION	1500 POINTS

Figure 1 Assigned point values

II. Location and Setup

INSPECTION

1. Remove the game from its shipping crate.

2. Inspect the entire outside of it for any signs of damage.
   - Any scratches? Dents? Cracks?
   - Any broken controls?
   - Any broken glass or plastic?
   - Just look it over closely and make a note of any signs of damage.

3. Remove the shipping cleats from the bottom of the cabinet.

4. Install the four levelers, one at each corner of the cabinet.
   - Level the cabinet.

5. Open the cabinet and inspect the inside of the game for any signs of damage. See Figure 2.
   - Also check to make sure all plug-in connectors on the wire harness are firmly seated.

> **NOTE:** All connectors or plugs are keyed so they will only go together when all pins are properly lined up.

   - Replug any connectors found unplugged. DO NOT FORCE PLUGS ONTO CONNECTORS. DO NOT FORCE PLUGS TOGETHER. If it won't go on easily, assuming the keys are lined up, it either does not belong there or is damaged.
   - Make sure all printed circuit boards (P.C.B.'s) are firmly seated in their connectors. See Figure 2. These connectors are also keyed. The P.C.B.'s will only go into them one way without being damaged.
   - Note the location of the game's serial number. See Figure 2.
   - Check all major subassemblies to be sure they are mounted securely. These are called out in Figures 2 & 3.
     Power supply.
     Control panel(s).
     T.V. monitor.
     Other P.C.B.'s and/or P.C.B. rack, etc.
     Transformer board assembly.

6. Make a note of any problems that can't be easily corrected.

7. Call your distributor and/or service man about your problem list.

INSTALLATION

1. Location requirements:

Power:
Domestic 110 V @ 60 Hz
Foreign 200 V to 240 V @ 50 Hz

Temperature: 32° to 100° F (0° to 38° C)

Humidity: Not over 95% relative

Space required:
Upright   25" x 29" (63 x 73cm)
Mini   20" x 24" (50 x 60cm)
Cocktail 32" x 22" (81 x 55cm)

Game height:
Upright 70" (175cm)
Mini   61" (153cm)
Cocktail 29" (73cm)

2. Voltage Selection:

Your game is designed to work properly on the line voltage where you are located. Check your line voltage with a meter to determine what its value is. Then check the power input wires to the main power supply transformer on your game to be sure they are connected to taps which correspond to your line voltage value.

If the power input wires to the main power supply transformer are not connected to taps which correspond to your local line voltage, move them to the proper taps.

If the line voltage in your area falls outside the upper or lower limits of the range of inputs covered by the main power supply transformer, **DO NOT PLUG YOUR GAME IN** until you have talked with your distributor and/or service man and obtained a solution to this problem. Otherwise you could damage your game.

3. Interlock and power ON/OFF switches. See Figure 2.

   - To help prevent the possibility of getting an electric shock while working inside the game cabinet, interlock switches have been installed at each cabinet access door (this **DOES NOT** include the coin door in the Upright and Mini models).
   - When any access door is opened, the interlock switch installed there turns off all power to the game.
   - Check each interlock switch for proper operation.

SERIAL NUMBER

ON/OFF SWITCH

T.V. MONITOR

INTERLOCK SWITCH

CARD RACK

TRANSFORMER BOARD ASSY (NOT SEEN)

POWER SUPPLY PCB

UPRIGHT

SERIAL NUMBER

T.V. MONITOR

INTERLOCK SWITCH

POWER SUPPLY PCB

CARD RACK

ON/OFF SWITCH

TRANSFORMER BOARD ASSY (NOT SEEN)

MINI

SERIAL NUMBER (MAY BE LOCATED ON ANY CORNER)

CONTROL PANEL PLAYER 1

T.V. MONITOR

TRANSFORMER BOARD ASSY

CONTROL PANEL PLAYER 2

CARD RACK

POWER SUPPLY PCB

INTERLOCK SWITCH (INSIDE DOOR)

ON/OFF SWITCH LOCATED UNDER TABLE ON PLAYER 2 SIDE

COCKTAIL

Figure 2 Location of serial number, interlock switch, on/off switch & major subassemblies

2-2

CONTROL PANEL

CONTROL PANEL

UPRIGHT
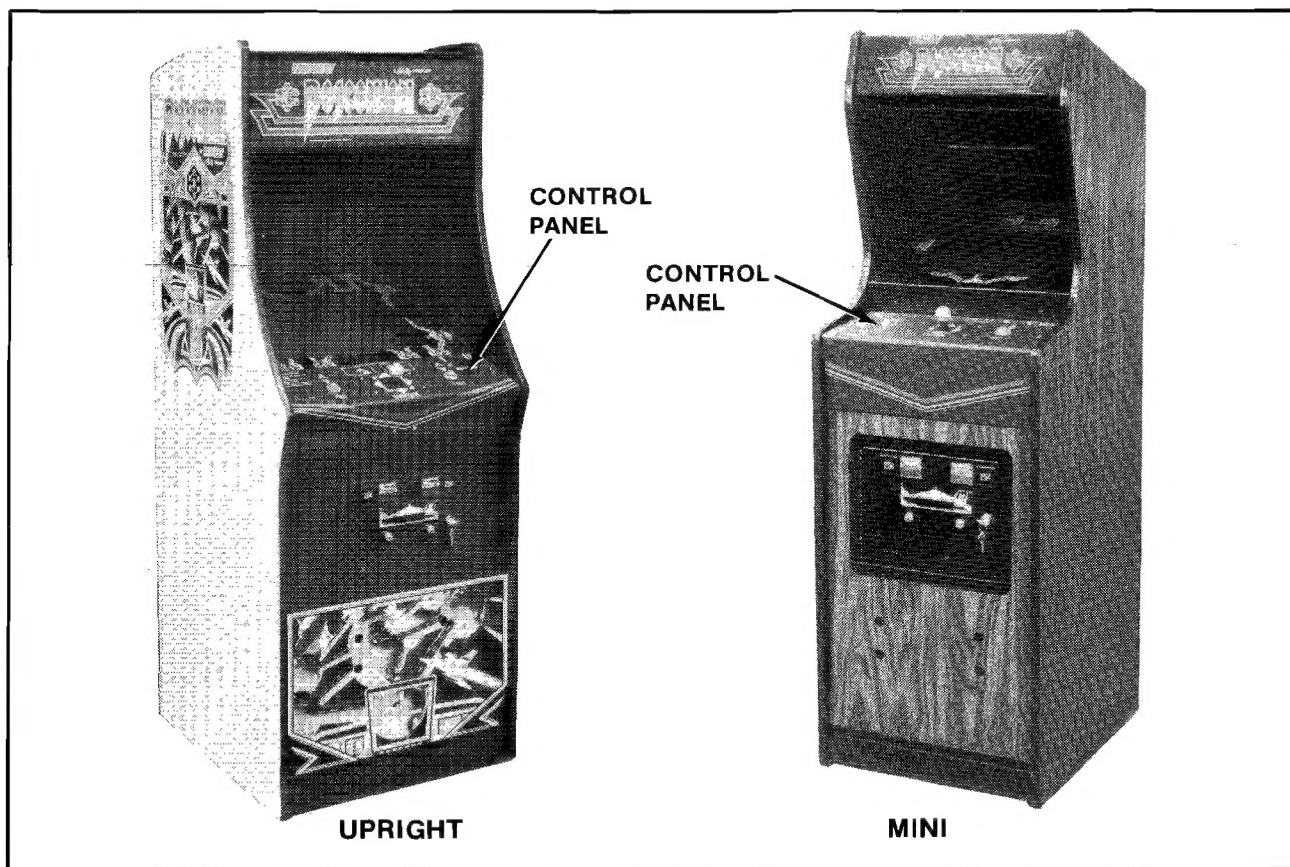
MINI

Figure 3 Major subassemblies (cont. from FIG. 2)

After checking the line voltage in your area and determining that the input wires to the main power supply transformer of your game are connected properly — or — after obtaining a solution to your over or under voltage problem from your distributor and/or your service man, plug the game into your A.C. wall outlet.

The game ON/OFF switches for all models are located as shown in Figure 2. Turn the game on and allow it to warm up a few minutes.

Slowly open each access door to the game (this **does not** include the coin door on the Upright and Mini models).

As the door is opened approximately 1" (2.54cm) the power to the game should go off (the T.V. monitor, all the lights, and all sounds will stop).

If this does not happen, check the interlock switch by this door to see if it has broken loose from its mounting or if it is stuck in the "ON" position.

If the switch is found to be bad, turn the game off, unplug it, and replace the interlock switch.

When done, plug the game back into the wall outlet, close the access door, and turn the game back on.

After the game has warmed up, repeat the above interlock switch test.

When the interlock switch is working properly and turns the power to the game off, power may be restored to the game with the access door(s) open. Take hold of the interlock switch plunger and **gently** pull it out to its fully extended position. THIS IS TO BE USED **ONLY** FOR SERVICING THE GAME. See Figure 4.

PULL
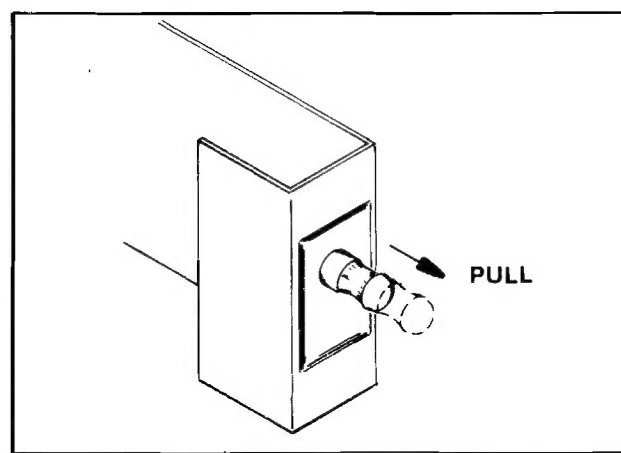
Figure 4 Interlock switch operation

SELF-TEST

Your new game will Self-Test itself to see if it has any bad parts. The information it receives while testing itself will be shown on the T.V. monitor. Some information can also be heard through the games speaker system. See the GAME OPERATION section for a more detailed description of this function.

When there is a bad result according to the Self-Test, call your distributor and/or service man to have the trouble fixed unless it is something you can do yourself (such as replace a bad RAM or ROM chip).

GAME VOLUME ADJUSTMENT CONTROL. See Figure 5.

The game volume control pot is located on the CPU board. The other board is the video board. There is only one pot. For adjustment, it may be reached through the rear access door on the Upright and Mini models. On the Cocktail Table model, you will have to open the table top to reach it.

To make the sounds louder, turn the pot clockwise as you face it (⌒↘).

To make the sounds **less** loud, turn the pot counter-clockwise as you face it (↙⌒).

OPTION SWITCH SETTINGS

To change the option switch settings, you DO NOT have to take the CPU board out of the game. They can be easily reached through the rear access door on the Upright and Mini models. On the Cocktail Table model, you do have to open the table top to reach them.

When changing any options, ALWAYS put the game into the Self-Test mode, make your changes, check the results on the monitor screen, take the game out of the Self-Test mode, and play the game to be sure the switches have worked properly and that no switches were accidentally moved that were not meant to be. (These switches are small and this can happen.)

The option switch settings and what they will make the game do are shown in Figure 6. See Figure 5 for option switch locations.
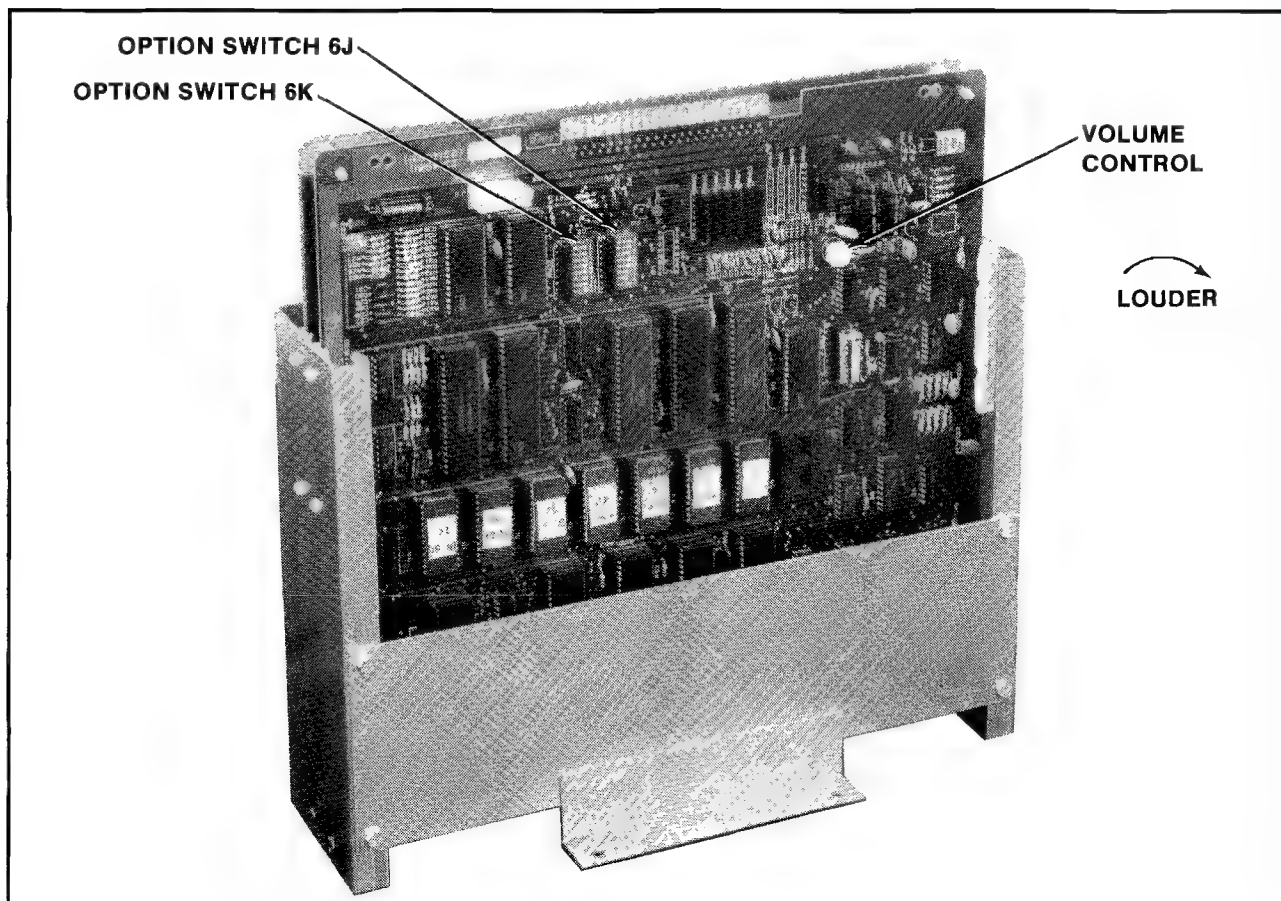
Figure 5 Location of option switches and volume control

BOSCONIAN
OPTION SWITCH SETTINGS

DIP SWITCH 6J

	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
1 PLAYER GAME PRESS THE 1 PLAYER START BUTTON 1, 2, 3, or 5 FIGHTERS	OFF						NOT	USED
2 PLAYER GAME PRESS THE 2 PLAYER START BUTTON 1, 2, 3, OR 5 FIGHTERS **EACH**	OFF						NOT	USED
1 PLAYER GAME PRESS THE 1 PLAYER START BUTTON 1, 2, 3, OR 5 FIGHTERS	ON						NOT	USED
1 PLAYER GAME **WITH 3, 5, 7, OR 11 FIGHTERS** PRESS THE **2 PLAYER** START BUTTON	ON						NOT	USED

DIFFICULTY LEVEL SETTINGS — "B" IS THE EASIEST AND "C" IS THE MOST DIFFICULT

	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
RANK "A" — STANDARD LEVEL OF DIFFICULTY	OFF	OFF					NOT	
RANK "B" — EASIEST LEVEL OF DIFFICULTY	OFF	ON					USED	
RANK "C" — HARDEST LEVEL OF DIFFICULTY	ON	OFF					NOT	
RANK "AUTO" — (MEASURES PLAYERS SKILL LEVEL)	ON	ON					USED	

	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
NO GAME CONTINUATION FEATURE. PLAYER(S) MAY CONTINUE GAME FROM PRESENT ROUND AFTER LAST SHIP HAS BEEN DESTROYED. **THIS COSTS ADDITIONAL CREDITS.** PLAYER(S) SCORE(S) ARE RETURNED TO **ZERO — "O".**				ON / OFF			NOT / USED	
GAME PROVIDES SOUND IN **ATTRACT MODE** GAME **DOES NOT** PROVIDE SOUND IN **ATTRACT MODE**						ON / OFF	NOT / USED	
FREEZE VIDEO (MONITOR PRESENTATION STOPS MOVING) MONITOR OPERATES NORMALLY							ON / OFF	NOT / USED

COIN COUNTER

	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
ONE WAY TWO WAY							NOT / USED	ON / OFF

NOTE: SWITCH NUMBER 6J-7 IS NOT USED AND SHOULD **ALWAYS** REMAIN IN THE **"OFF"** POSITION.

Figure 6 Option switch settings

BOSCONIAN

OPTION SWITCH SETTINGS

DIP SWITCH 6K

COINS PER CREDIT

		SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
FREE PLAY		ON	ON	ON					
4 COINS	1 CREDIT	OFF	ON	ON					
3 COINS	1 CREDIT	ON	OFF	ON					
2 COINS	1 CREDIT	OFF	OFF	ON					
2 COINS	3 CREDITS	ON	ON	OFF					
1 COIN	3 CREDITS	OFF	ON	OFF					
1 COIN	2 CREDITS	ON	OFF	OFF					
1 COIN	1 CREDIT	OFF	OFF	OFF					

BONUS SHIPS AWARDED AT THE FOLLOWING POINT VALUES:

BEGAN WITH 1, 2 OR 3 FIGHTERS		BEGAN WITH 5 FIGHTERS		SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
1st SHIP	20000	1st SHIP	30000				ON	ON	OFF		
2nd SHIP	70000	2nd SHIP	120000								
AND EVERY	70000										
1st SHIP	15000	1st SHIP	20000				ON	OFF	ON		
2nd SHIP	50000	2nd SHIP	70000								
AND EVERY	50000										
1st SHIP	15000	1st SHIP	30000				ON	OFF	OFF		
2nd SHIP	50000	2nd SHIP	100000								
		AND EVERY	100000								
1st SHIP	10000	1st SHIP	15000				OFF	ON	ON		
2nd SHIP	50000	2nd SHIP	70000								
AND EVERY	50000										
1st SHIP	30000	1st SHIP	30000				OFF	ON	OFF		
2nd SHIP	100000	2nd SHIP	80000								
AND EVERY	100000	AND EVERY	80000								
1st SHIP	15000	1st SHIP	20000				OFF	OFF	ON		
2nd SHIP	70000	2nd SHIP	100000								
AND EVERY	70000										
1st SHIP	20000	1st SHIP	30000				OFF	OFF	OFF		
2nd SHIP	70000	2nd SHIP	120000								
		AND EVERY	120000								
NO BONUS SHIPS GIVEN WITH THIS SETTING							ON	ON	ON		

DETERMINES NUMBER OF SPACE FIGHTERS PLAYER BEGINS GAME WITH:

	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
1 SPACE FIGHTER							ON	ON
2 SPACE FIGHTERS							OFF	ON
3 SPACE FIGHTERS							ON	OFF
5 SPACE FIGHTERS							OFF	OFF

Figure 6 Option switch settings (cont'd.)

Game Operation

BOSCONIAN is a one or a two player game with a color T.V. monitor. The game gives a display which has all the parts shown in Figure 7.

The game has five possible modes of operation: ATTRACT, READY-TO-PLAY, PLAY, HIGH SCORE/ INITIAL, and SELF-TEST.
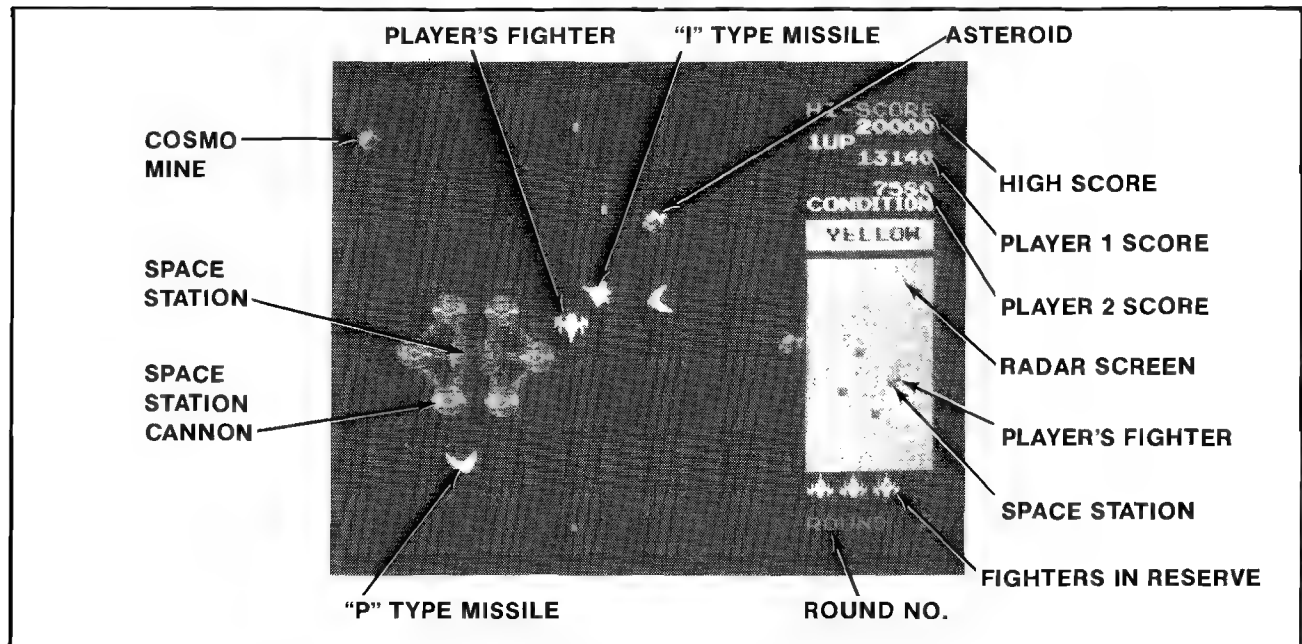
Figure 7 Identification of "on screen" graphics during play

SELF-TEST MODE

The Self-Test mode is a special mode for checking the game switches and computer functions. It is the easiest and best way to check for proper operation of the entire game.

NOTE: Putting the game into Self-Test will cause it to **erase** any CREDITS shown at the lower left corner of the screen from its memory.

You may begin a Self-Test at any time by sliding the Self-Test switch to the "ON" position after the power to the game is on. Test switch is located inside coin door under coin meter. When this is done, the game will react as follows:

1. First, you will see a moving multicolored pattern appear on the screen.

2. Immediately following this, a rightside up test display is shown on the monitor screen. This will remain until you set the Self-Test switch back to the "OFF" position. This test display is shown below.

**SELF-TEST DISPLAY
AND BOARD LOCATION COORDINATES**

RAM OK or (a number and a letter, i.e. 1L, 3H, etc.)
ROM OK or (a number, i.e. 0, 2, etc.)
UPRIGHT or (TABLE)
*1 COIN   *1 CREDIT
*3 SHIPS
RANK *A (B, C, AUTO)
SOUND 00 (01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19)
1ST BONUS *20000 PTS
2ND BONUS *70000 PTS
*AND EVERY 70000 PTS

* = switch selectable

DISPLAY	DESCRIPTION
RAM OK	All RAMs are good.
RAM 1L	RAM located on CPU PC board at position 2N is bad.
RAM 1H	RAM located on CPU PC board at position 2N is bad.
RAM 2L	RAM located on CPU PC board at position 2N is bad.
RAM 2H	RAM located on CPU PC board at position 2N is bad.
RAM 3L	RAM located on Video PC board at position 1E is bad.
RAM 3H	RAM located on Video PC board at position 1E is bad.
RAM 4L	RAM located on Video PC board at position 1E is bad.
RAM 4H	RAM located on Video PC board at position 1E is bad.
RAM 5L	RAM located on Video PC board at position 1H is bad.
RAM 5H	RAM located on Video PC board at position 1H is bad.
RAM 6L	RAM located on Video PC board at position 1H is bad.
RAM 6H	RAM located on Video PC board at position 1H is bad.
ROM OK	All ROMs are good.
ROM 0	ROM located on CPU PC board at position 3N is bad.
ROM 1	ROM located on CPU PC board at position 3M is bad.
ROM 2	ROM located on CPU PC board at position 3L is bad.
ROM 3	ROM located on CPU PC board at position 3K is bad.
ROM 4	ROM located on CPU PC board at position 3J is bad.
ROM 5	ROM located on CPU PC board at position 3H is bad.
ROM 6	ROM located on CPU PC board at position 3E is bad.

3. If a bad ROM or RAM chip is found by the game's internal check system during the Self-Test, the game indicates this to you by showing the location code of the bad chip(s) in place of the letters "OK". The above table translates the chip location codes into actual positions on either the Video or the CPU P.C. Boards.

4. "RANK" is a difficulty setting, with "RANK B" being the **least** difficult level of play and "RANK C" being the **most** difficult level of play. "RANK AUTO"; at this setting the game measures the player's skill level and progressively gets harder as the player gets better. See the "OPTION SWITCH SETTINGS" table.

5. To check "SOUND" (the game has 20 different sounds):
   a) Move the controller to the right momentarily and release it — "SOUND" number changes from "00" to "01" and you hear sound "01".
   b) Press any button or activate the coin switches and sound "01" will change to sound "02" and it is heard.

   c) Repeat Step 2 with a different button or switch, etc. and — "SOUND 02" changes to "SOUND 03" and it is heard — and so on.

6. To check your game function switches and buttons (coin counter switches, FIRE button, 1 PLAYER and 2 PLAYER buttons): activate each one while the game is in the Self-Test mode. You should hear a different game sound for each activation. If you do not hear it, the switch/button is either not working, miswired, or disconnected. Check it out thoroughly.

7. When finished with the Self-Test mode, slide the Self-Test switch back to the "OFF" position.
   • A cross hatch pattern appears on the monitor screen for about 2 seconds.
   • If you wish to keep this test pattern on the monitor screen for further use, slide Self-Test switch back to the "ON" position **after** the cross hatch appears and **before** it disappears.
   • When finished with the cross hatch pattern, set the Self-Test switch to the "OFF" position.
   • Normal game functions will now return to the monitor screen.

ATTRACT MODE

1. The Attract mode starts:
   - Just after power has been turned on to the game. (Self-Test switch is in the "OFF" position.)
   - After a Self-Test has been completed. (Performing a Self-Test sets the credits in the game's memory to zero "0".)
   - After a play has been finished, the score was not high enough to put the game into the High Score/Initial mode, and there are no more credits left in the game's memory.
   - After the High Score/Initial mode when there are no more credits left in its memory.
   - In the Attract mode, the game will give the following displays **centered** on the monitor screen:
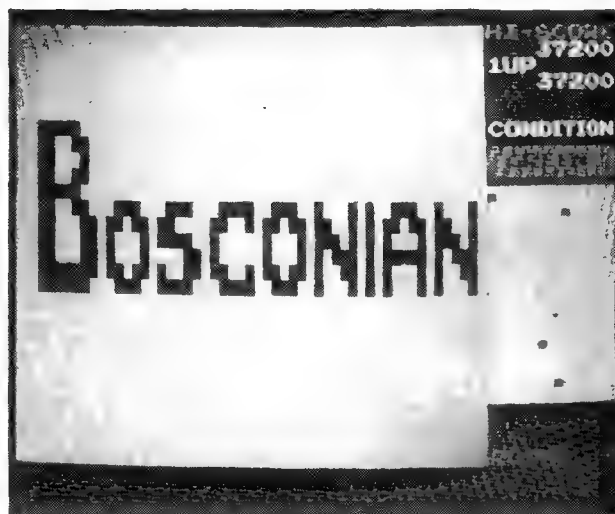
DISPLAY 1
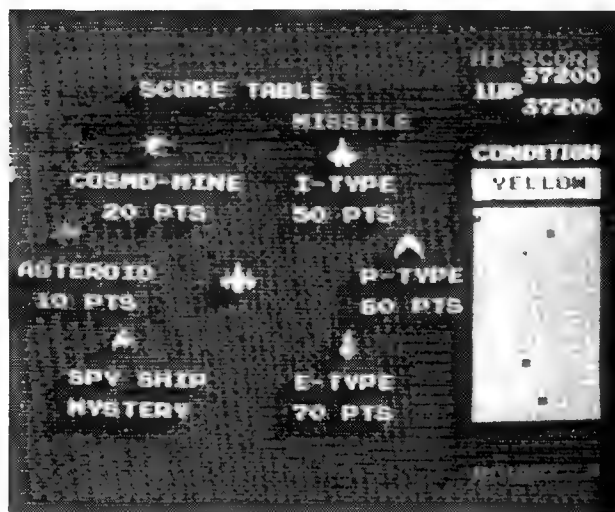
DISPLAY 2

   - The above display and the one that follows give the point values assigned to the different things that can be destroyed by your space fighter.
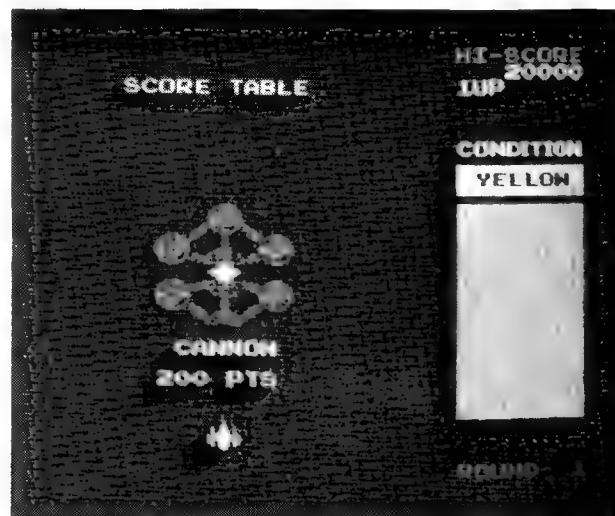
DISPLAY 3a
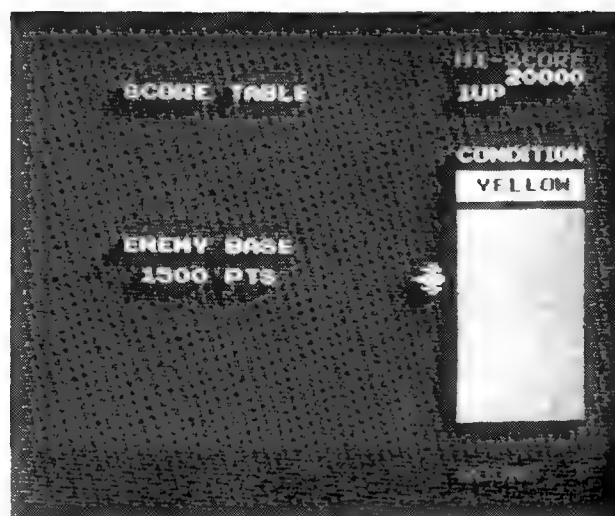
DISPLAY 3b

   - The fourth display in the attract mode sequence shows simulated game play.

   - The next display in the series lists the five highest scoring individuals, "THE LIST OF SPACE FIGHTERS", that have played the game to date.
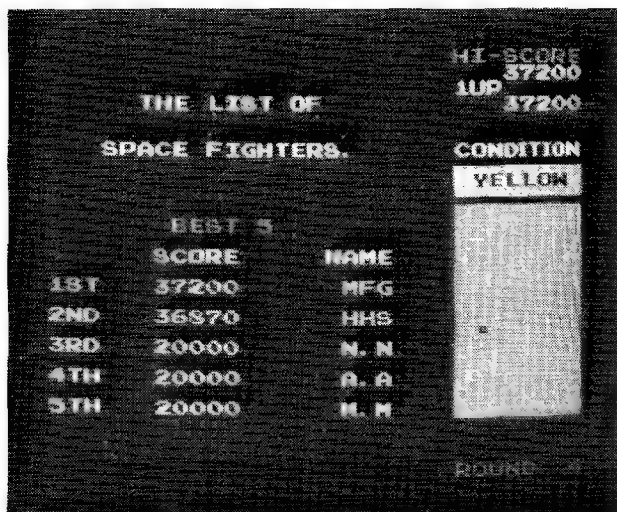
DISPLAY 5

• No matter where the game is in the Attract mode sequence, it will immediately go to the following display as soon as a game has been paid for. It will hold this display on the monitor screen until the "1 PLAYER" or the "2 PLAYER" start button is pushed.
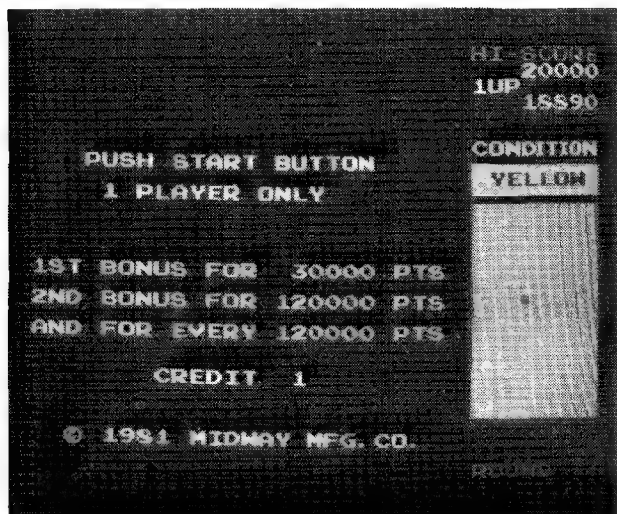
READY-TO-PLAY MODE

1. The Ready-To-Play mode starts when enough coins have been accepted for a 1 or a 2 player game.

2. The Ready-To-Play mode ends when either the "1 PLAYER" or the "2 PLAYER" push button is pressed.

3. In the Ready-To-Play mode, the game will give the above display **centered on** the monitor screen.

4. If no START button is pressed, the game will hold the above display on the screen indefinitely.

PLAY MODE

1. The Play mode begins when either the "1 PLAYER" or the "2 PLAYER" start button is pressed. "PLAYER ONE" — "READY" is displayed **centered** on the screen.

2. The Play mode ends when all of your space fighters have been destroyed. When this happens, "GAME OVER" is written across the center of the monitor screen.

3. The game is made up of convoys of invading aliens. You, as defender, try to destroy as many convoys as you can. They are hard, tricky fighters. Your task will not be easy! Just remember that when shooting at the space station hub to take out the whole station, the missile launching doors MUST be at least part way open in order for your shots to be able to destroy the entire space station. Or, if you destroy all six Cannons on the space station rim, the entire space station will go up with the destruction of the sixth Cannon.

4. The convoys are displayed one at a time on the long range scanner to the right of the screen. They are made up of BOSCONIAN Space Station worlds which are surrounded by Cosmo-Mines and Asteroids. These space stations send out three different types of missiles to try to blow you out of space. They are: "I-TYPE", which are purple in color; "P-TYPE", which are silver-blue in color; and "E-TYPE", which are red in color.

The longer you are in a particular "ROUND" (ROUND 1, ROUND 2, etc.), the more missiles the enemy space stations will send out after you. (What "ROUND" you're in is indicated at the lower right hand corner of the screen.)

You **MUST** destroy every BOSCONIAN space station world in a particular "ROUND" to advance to the next one.

There are also special Attack Formations made up of five missiles each which will appear continuously throughout the game. If they are completely destroyed, bonus points will be awarded as follows:

OBJECT DESTROYED	BONUS POINT VALUE
ENTIRE I-TYPE MISSILE ATTACK FORMATION	500 POINTS
ENTIRE P-TYPE MISSILE ATTACK FORMATION	1000 POINTS
ENTIRE E-TYPE MISSILE ATTACK FORMATION	1500 POINTS

The Rounds in which the different Attack Formations will appear are as follows:

ROUND NUMBER	VEHICLE TYPE
1	I
2	P
3	I
4	P
5	P
6	E
7	E
8	P
9	E
10	E
11	P
12	I
13	P
14	E
15	E
16	E
17	E

ROUND 18 AND BEYOND —
REPEATS VEHICLE
SEQUENCE FOUND FROM ROUND 12
THROUGH 17.

These Attack Formations are lead by one missile that is the same shape as the other four but is a slightly different color. If you shoot this "lead — or — control missile", the Attack Formation will break up and go in different directions.

When you destroy the last space station of a convoy, the screen gives the following display **centered** on the monitor screen:

PLAYER ONE
READY

The number of the next ROUND is displayed in the lower right corner of the screen, the next convoy of BOSCONIAN space station worlds appears in the long range scanner at the right side of the monitor screen, your space fighter appears at the center of the screen, and play begins.

As you destroy more convoys, the attacks on you become faster, are in a more rapid succession, and follow trickier flight patterns. For instance, they will try to trap you in a cross fire, or with your back to a mine field, etc. You've really got to watch them closely.

When the enemy happens to destroy one of your fighters, assuming you have at least one reserve fighter left, the words "PLAYER ONE" — "READY" appear **centered** on the monitor screen BEFORE play begins again.

When the enemy destroys your **last** fighter, the words "GAME OVER" are displayed **centered** on the monitor screen. (AT THIS POINT, SEVERAL DIFFERENT THINGS CAN HAPPEN DEPENDING ON WHETHER THE **"GAME CONTINUATION FEATURE"** HAS BEEN SELECTED.)

"GAME CONTINUATION FEATURE" HAS **NOT** BEEN SELECTED:

If your score was the highest one of the five best scores, the game will tell you this by putting the following display on the screen.
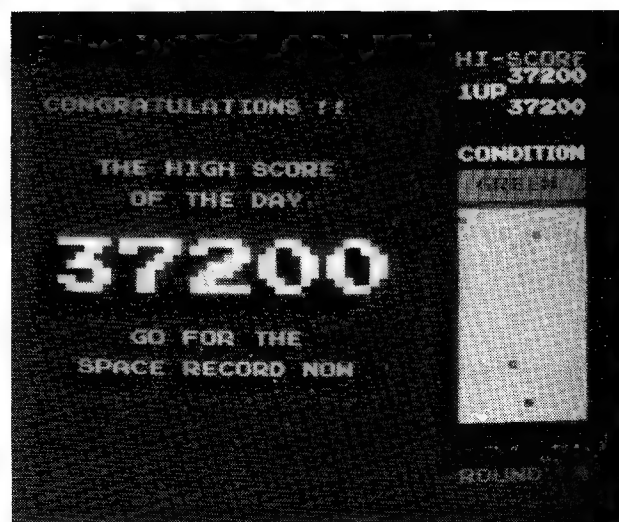
After this display, the game will go into the High Score/Initial mode immediately. If your score was not the highest of the day, but was still one of the "BEST 5", the game will go directly to the High Score/Initial mode presentation. If your score is not high enough to cause the game to go into the High Score/Initial mode, it will either go to the Attract mode (if there are no more credits left in its memory) or into the Ready-To-Play mode (if there are still credits left in its memory).

"GAME CONTINUATION FEATURE" **HAS BEEN** SELECTED:

The game will act in the same manner as stated above **EXCEPT IN THE CASE WHERE** your score is not high enough to cause the game to go into the High Score/Initial mode and there are no more credits left in its memory. In this case, it will give the following display **centered** on the monitor screen:


If there are ONLY enough credits left in the game's memory for a **ONE** PLAYER GAME, the above message is modified to read as follows:

If there are at least enough credits left in the game's memory for a **TWO** PLAYER GAME, the above message is modified to read this way:
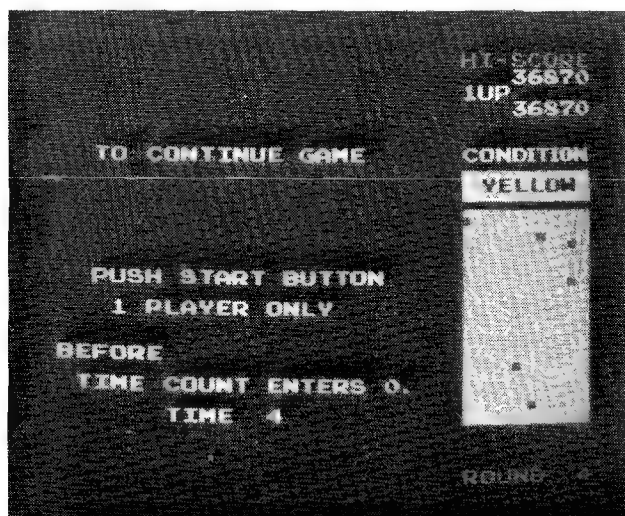
If you decide to exercise any of the above options BEFORE the 15 second time limit runs out, your score will be set BACK to ZERO "0", the ROUND number that you were in when your last space fighter was destroyed will REMAIN THE SAME, and play will begin in the same sequence as it has for all previous games.

If you **do not** decide to exercise any of the above options BEFORE the 15 second time limit runs out, the game will either go to the Attract mode (if there are no more credits left in its memory) or into the Ready-To-Play mode (if there are still credits left in its memory).

Also, if you do decide to play another game AFTER the 15 second GAME CONTINUATION time limit has run out, you will be starting at ROUND 1 again with your score at ZERO "0".

HIGH SCORE/INITIAL MODE

In the High Score/Initial mode the game gives a display which looks like the following:
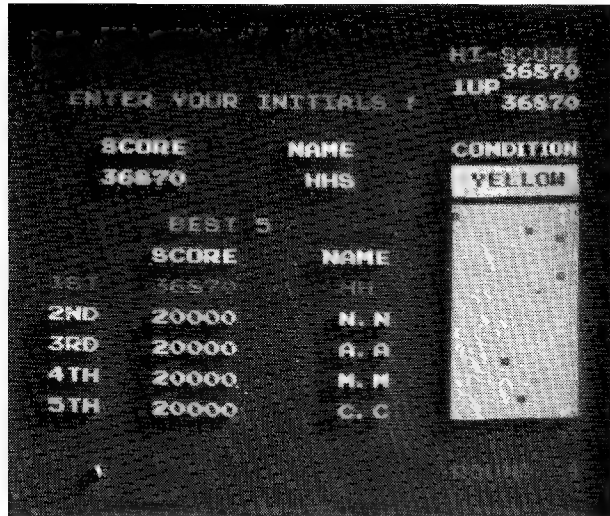
When in the High Score/Initial mode, there are three "A"'s under the top "NAME" heading on the screen. The first "A" is red and flashing on and off. The other two "A"'s are white. Farther down the screen under the "BEST 5" heading, your score has been entered in bright green and the space for your initials is blank. All other scores are white.

By moving the controller stick to the right, the flashing letter can be made to sequence forward through the alphabet: "A", "B", "C", "D", etc. By moving the controller stick to the left, the flashing letter can be made to sequence backward through the alphabet: "Z", "Y", "X", "W", etc.

When you reach your initial, release the controller and push the FIRE button. Your initial is frozen in place and appears in the blank space opposite your score at the same time. If you do not wish to put your initials opposite your score, just press the FIRE button three times. Three "A"'s will appear opposite your score.

After the High Score/Initial mode, the game will either go to the Attract mode (if there are no more credits left in its memory) or into the Ready-To-Play mode (if there are still credits left in its memory).

Most of the above holds true in the "2 PLAYER" mode also. But there are a few minor differences.

TWO PLAYER OPERATION

The Upright, Mini, and Cocktail Table models all have two player operation.

In the two player mode, the rules of play are the same as in the single player mode. There are some additional rules, however:

1. In the Upright and Mini models, the players must take turns at the controls.
2. In the Cocktail Table model, each player has his own set of individual controls. The picture will flip to face you when it is your turn. (When it is not your turn, your set of controls will have **NO** effect on the game.)
3. Your turn lasts until the enemy blows up your space fighter. At this point, the game will do one of several things depending on whether or not the destroyed fighter was your last or if you still have others remaining in reserve.

FIGHTER DESTROYED — FIGHTERS REMAINING IN RESERVE

- The attack stops.
- Next, the "ROUND" changes to the "ROUND" number the other player is in, it displays "PLAYER ___" — "READY" while what's left of the other player's convoy appears on the long range scanner at the right of the screen.
- Play begins for the other player.

FIGHTER DESTROYED — NO FIGHERS REMAINING IN RESERVE

- Game displays "GAME OVER".
- Next, if your score was the highest one of the five best scores, the game will tell you this by putting the congratulatory display on the screen. After this display, it will go into the High Score/Initial mode immediately. If your score was not the highest of the day, but was still one of the "BEST 5", the game will go directly to the High Score/Initial mode presentation.
- After this, the "ROUND" changes to the "ROUND" number the other player is in, the game will display "PLAYER ___" — "READY" while what's left of the other player's convoy appears on the long range scanner at the right of the screen and play begins for the other player.
- If your score was not high enough to cause the game to go into the High Score/Initial mode, the game will display "PLAYER ___" — "READY" while what's left of the other player's convoy appears on the long range scanner at the right of the screen and play begins for the other player.

III. Maintenance and Repair

Your BOSCONIAN game needs certain types of maintenance to keep it in good working order. Clean, well maintained games attract players and earn more profits.

The most important thing for you to remember is to run the Self-Test EVERY TIME you collect money from the coin box. **JUST LOOKING** at your game **WILL NOT** tell you if all its controls and inside parts are working correctly. The Self-Test will inform you whether or not your game is working the way it should.

The second most important thing you should remember is to clean the outside of the game and coin acceptor mechanisms on a regular basis.

CLEANING

The outside of the game cabinet plus the metal can be cleaned with any non-abrasive household cleaner. However, the front of the T.V. monitor tube and **both sides** of all other glass and plastic on or in the game MUST be cleaned with anti-static cleaner **ONLY.** For cleaning the coin acceptors; hot soapy water may be used on the plastic ones and any household cleanser may be used on the metal ones. If you wish, special coin machine cleaners that leave no residue may be purchased from your distributor.

DO NOT dry-wipe any of the plastic panels. This is because any dust that was on them can scratch their surfaces. If this has happened, anyone looking through this type of damaged plastic would feel he was looking at the game through a fog. This fogging damage CAN NOT be repaired or reversed. The ONLY solution is to **replace** the damaged piece of plastic.

FUSE REPLACEMENT

This game contains several fuses located as shown in Figure 8.

1. UPRIGHT MODEL:
As viewed from the back, facing the cabinet, with the rear access door removed; the fuses are located on the Mech. Panel and the Power Supply Board.

2. MINI MODEL:
As viewed from the back, facing the cabinet, with the rear access door removed; the fuses are located on the Mech. Panel and the Power Supply Board.

3. COCKTAIL TABLE MODEL:
As viewed from the coin door side of the cabinet, with the monitor tilted open to one side; the fuses are located on the Mech. Panel and the Power Supply Board.

Replace fuses ONLY with the type and size listed in the Illustrated Parts Breakdown Section of this manual.

See the T.V. Monitor Manual (available on request from your distributor or monitor manufacturer) and/or the T.V. Troubleshooting Section of this manual for information on these fuses.

FUSES LOCATED ON TRANSFORMER BOARD & POWER SUPPLY
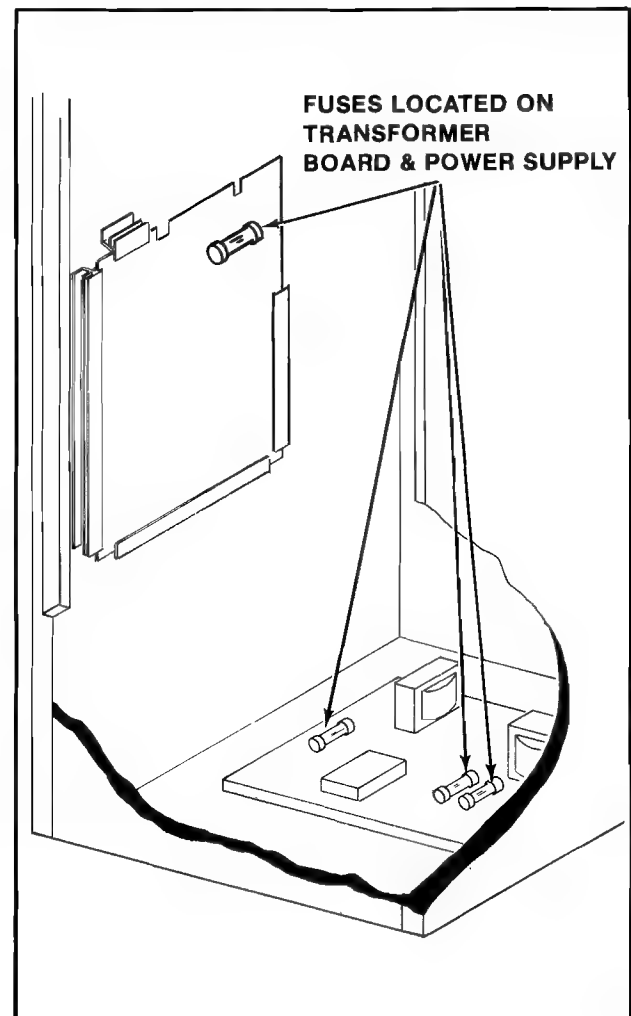
Figure 8 Location of fuses

OPENING THE CONTROL PANEL. See Figure 9.

1. UPRIGHT MODEL:

- The control panel is held in place by three latches, one on the left side, one on the right side, and one on the front center.

  They are spring loaded to provide constant positive pressure on their latch plates.

  They can be reached through the coin door **AFTER** turning power to the game off.

  To release the latches, lift up and toward the center of the control panel.

  Once they are released, unhook them from their latch plates.

- To remove the control panel:

  Raise it up and tilt it toward you until you can see the cable behind it.

  Cradling the control panel between yourself and the cabinet, disconnect it from its cabling.

  The control panel is now free and can be removed.

- To reinstall the control panel, reverse this procedure.

2. MINI MODEL:

- The control panel is held in place by two latches, one on the right side and one on the left side of the cabinet.

  They are spring loaded to provide constant positive pressure on their latch plates.

  They can be reached through the coin door **AFTER** turning power to the game off.

  To release the latches, lift up and toward the center of the control panel.

  Once they are released, unhook them from their latch plates.

- To remove the control panel:

  Raise it up and tilt it toward you until you can see the cable behind it.

  Cradling the control panel between yourself and the cabinet, disconnect it from its cabling.

  The control panel is now free and can be removed.

- To reinstall the control panel, reverse this procedure.
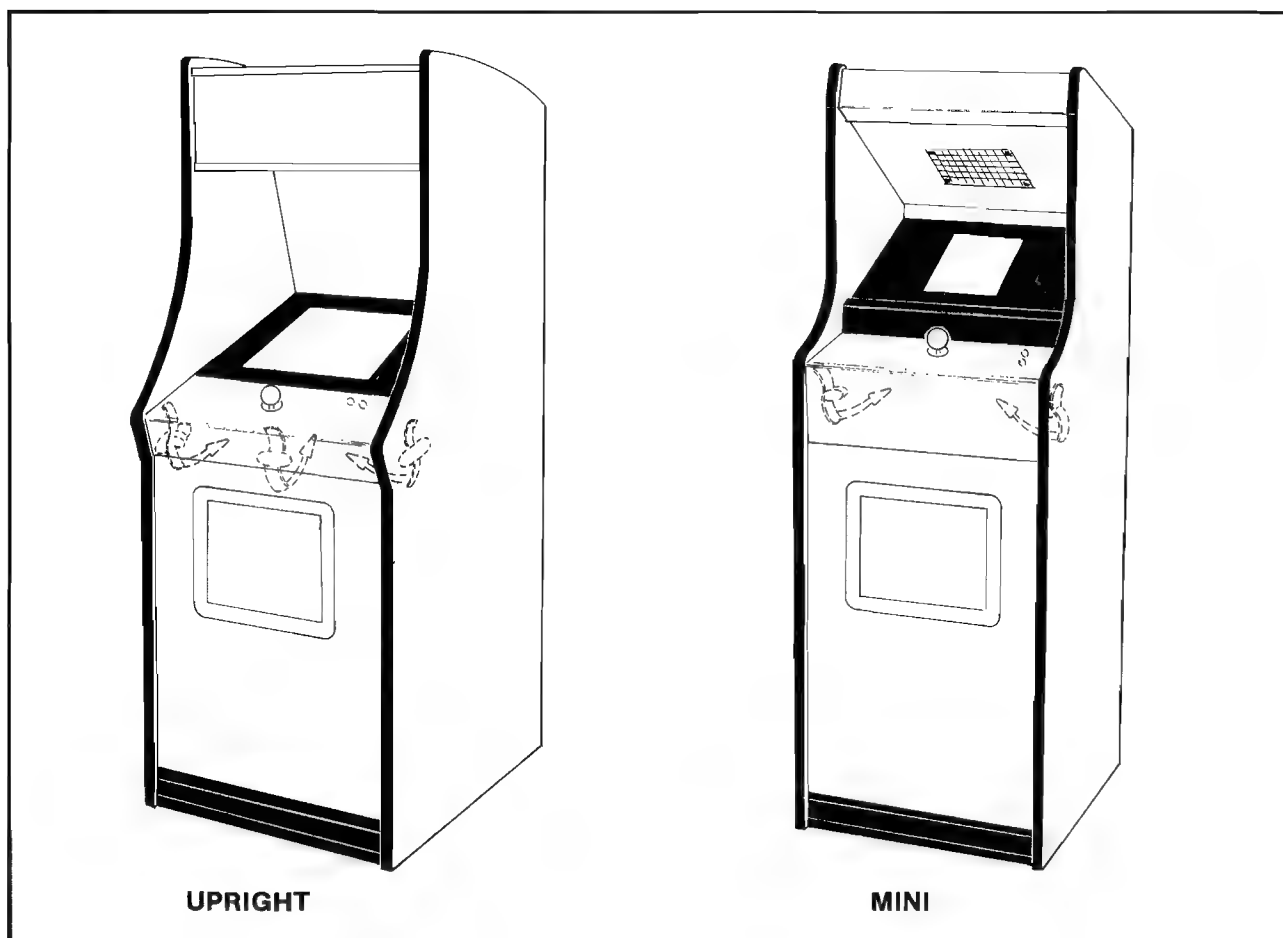
UPRIGHT   MINI

Figure 9 Removing control panel — Upright & Mini games
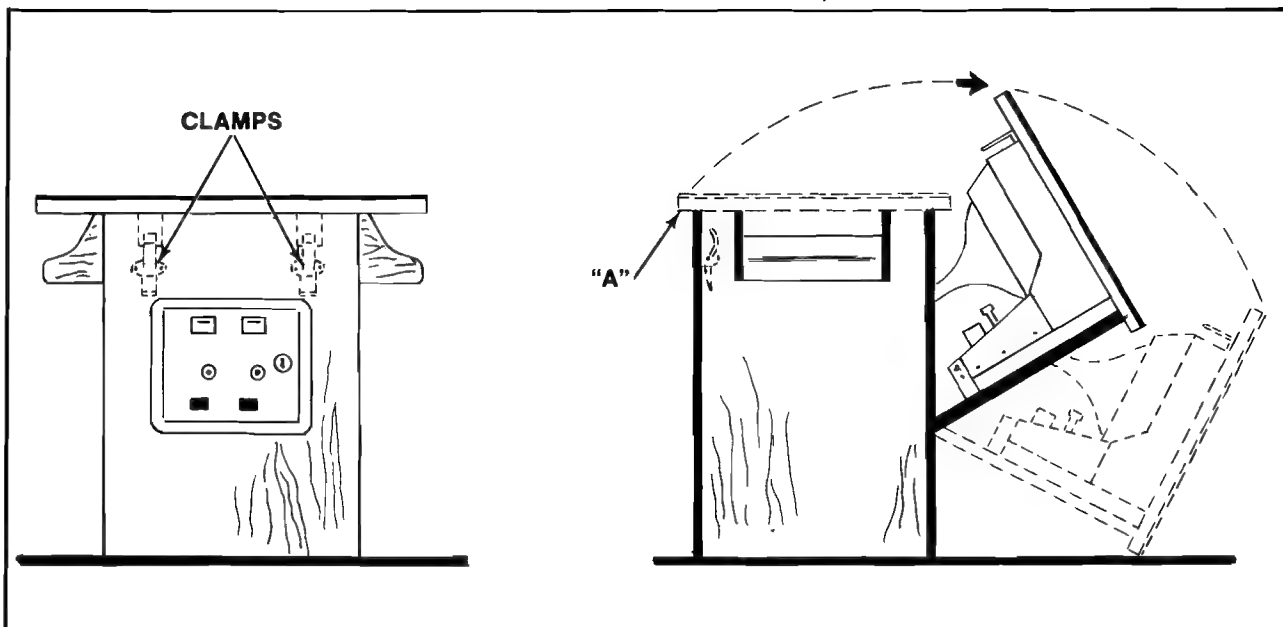
Figure 10 Opening the Cocktail game

3. COCKTAIL TABLE MODEL:

- Each control panel is held in place by several screws, two on the inside of the cabinet and three along the outside bottom edge of the control panel.

  Turn power to the game off.

  Open the coin box door and release the two latches indicated in Figure 10.

CAUTION: The right hand latch is very close to the HIGH VOLTAGE on the monitor.

  Once they're released, unhook them from their latch plates.

  Grasp the table top at "A" and open as indicated in Figure 10.

CAUTION: Due to the weight of the monitor, EXTREME CARE MUST be taken when opening the cabinet.

  Remove the screws which secure the control panel in place. See Figure 11.

- To remove the contol panel(s):

  Disconnect it from its cabling.

  The control panel is now free and can be removed.

- To reinstall the control panel, reverse this procedure.
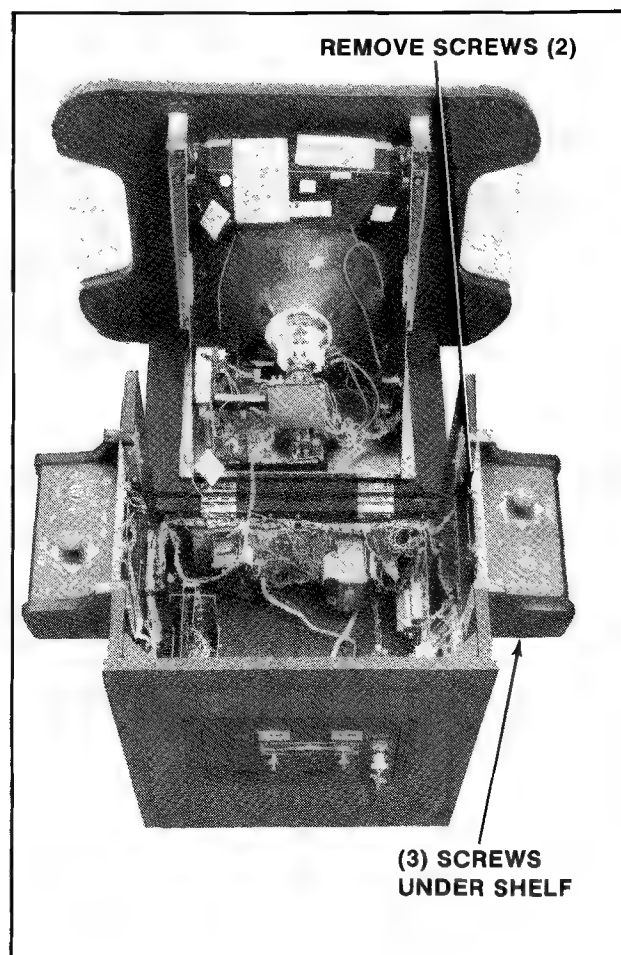
Figure 11 Removing control panel — Cocktail game

REMOVAL OF THE MAIN-DISPLAY-GLASS AND/OR THE T.V. BEZEL ASSEMBLY

1. UPRIGHT MODEL: See Figure 12.

NOTE: To do this, the latches which secure the control panel MUST be released. The control panel need not be removed. See the "UPRIGHT MODEL" procedure.

- Turn the power to the game off and remove the rear access door.

- Remove the screws from the glass support bracket and lift it out the back of the cabinet.

- Grasp the main-display-glass in the top center, lift up slightly and pull it out the rear of the cabinet.

- Loosen the screws which secure the T.V. bezel-glass-clamps in place.

  Move the clamps to the side and the bezel glass may be removed.

  Remove the above mentioned screws and the bezel with four bezel-glass-clamps may be removed.

- To reinstall the T.V. bezel assembly and the main-display-glass, reverse this procedure.

2. MINI MODEL: See Figure 13.

NOTE: In order to do this, the control panel **MUST** be removed first. See the "MINI MODEL" procedure.

- Turn the power off to the game and remove the control panel.

- Remove the screws which secure the glass clamping plate.

- Lift out the glass clamping plate. This frees the main-display-glass so it can be lifted up.

- By putting your finger in the hole in the middle of the main-display-glass support, you can lift it up and out.

- Remove the screws which secure the T.V. bezel assembly and lift it out.

NOTE: Use the hole in the center of the main-display-glass support to grasp it.

- Reverse this procedure to reinstall the T.V. bezel assembly and the main-display-glass.

Figure 12 Removing display glass—Upright game
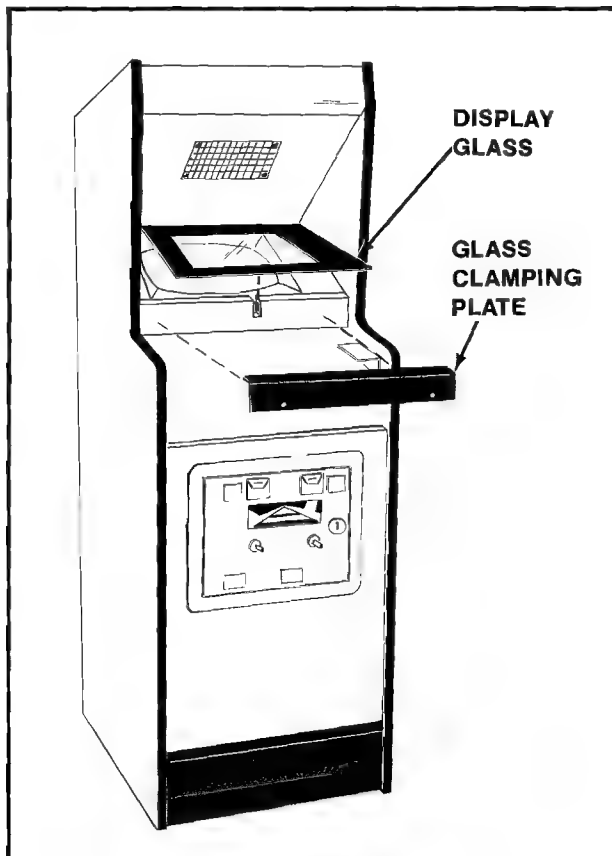
Figure 13 Removing display glass — Mini game

3. COCKTAIL TABLE MODEL: See Figure 14.

NOTE: This may be done with the table top in the open or the closed position. If you decide to open the table top, TURN THE POWER TO THE GAME OFF FIRST.

- Remove the screws which secure the table top glass clamps in place.
- Remove the table top glass.
- Lift out the T.V. bezel assembly.
- To reinstall the T.V. bezel assembly and the table top glass, reverse this procedure.

T.V. MONITOR REPLACEMENT

CAUTION: High voltages may exist in any television unit, even with the power disconnected. Use EXTREME CAUTION and do not touch electrical parts or the T.V. yoke area with your hands or with metal objects held in your hands!

In addition, BE SURE TO USE HEAVY GLOVES when handling the monitor. You could cut your hands on the metal T.V. chassis without such protection.

DANGER: The T.V. monitor DOES NOT contain an isolation transformer on its chassis (it is mounted instead on the floor of the cabinet). When servicing the monitor on a test bench, YOU MUST ISOLATE THE MONITOR FROM AC VOLTAGE WITH AN ISOLATION TRANSFORMER.

1. UPRIGHT MODEL: See Figure 15.

- Turn power off to the game.
- Open the rear access door.
- Completely disconnect the T.V. monitor from all its cabling. DON'T FORGET THE CHASSIS GROUND WIRE.

  Before removing T.V. monitor, the main-display-glass and bezel must be removed. See above "Upright Model" procedure.

  With the removal of only four bolts, the T.V. monitor and its mounting channels will be loose.

  The monitor mounting channels slide on top of and against two metal guides mounted to the cabinet's right and left sides. The monitor is removed by sliding it out the back of the cabinet. See Figure 15.

  To reinstall the T.V. monitor, reverse this procedure.

  After replacing the T.V. monitor, be sure to run the game Self-Test.

Figure 14 Removing top glass — Cocktail game

REMOVE
GLASS CLAMPS
(8)

REMOVE 4 BOLTS
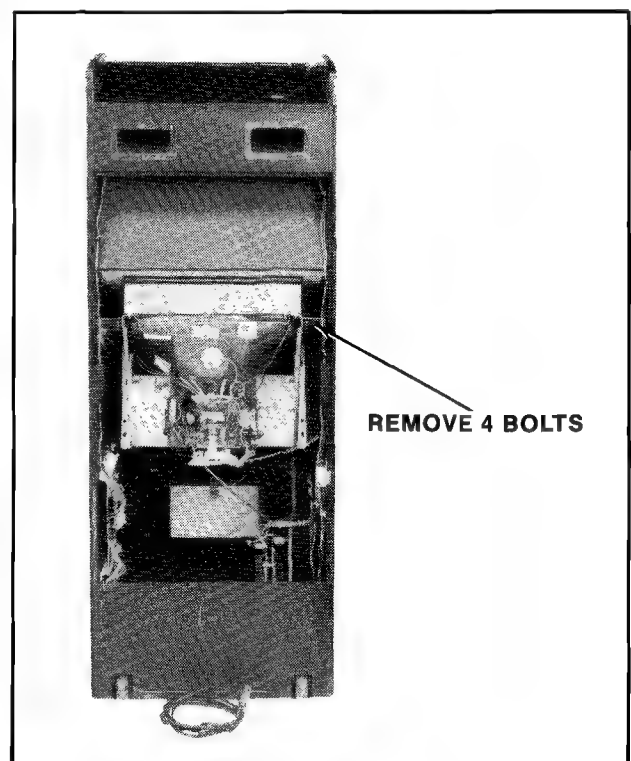
Figure 15 Replacing monitor — Upright game

2. **MINI MODEL:** See Figure 16.

Turn the power off to the game.

Open the rear access door.

Completely disconnect the T.V. monitor from all its cabling. DON'T FORGET THE CHASSIS GROUND WIRE.

Before removing the T.V. monitor, the main-display-glass and bezel must be removed. See above "Mini Model" procedure.

With the removal of only four nuts, the T.V. monitor will be loose.
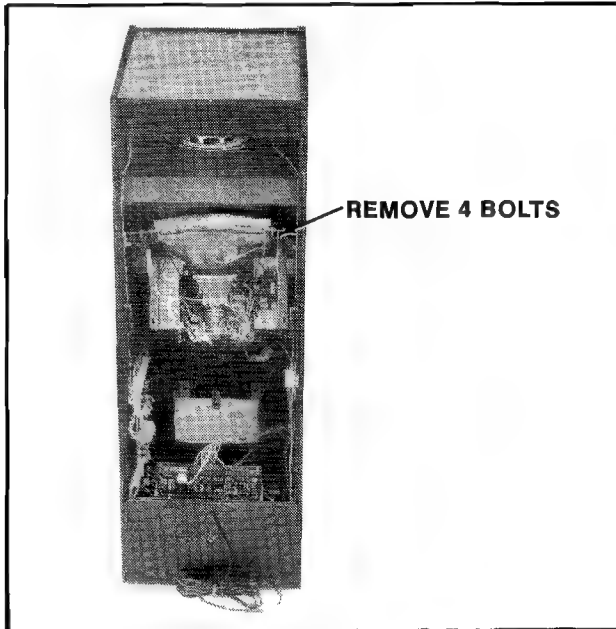
Figure 16 Replacing monitor — Mini game

> **CAUTION: BE SURE to support the T.V. monitor from the rear while removing the four bolts so it will not fall out of the cabinet.**

The monitor is removed by supporting it and pulling straight back as shown in Figure 16.

To reinstall the T.V. monitor, reverse this procedure.

After replacing the T.V. monitor, be sure to run the game Self-Test.

3. **COCKTAIL TABLE MODEL:** See Figure 18.

Turn power off to the game.

Open the coin box door and release the two latches indicated in Figure 17.

> **CAUTION: The right hand latch is very close to the HIGH VOLTAGE on the monitor.**

- Once the latches are released, unhook them from their latch plates.
- Grasp the table top at "A" and open it as indicated in Figure 17.

> **CAUTION: Due to the weight of the monitor, EXTREME CARE MUST be taken when opening the cabinet.**

- Remove the screws which hold the table top glass clamps in place.
- Remove the table top glass.
- Lift out the T.V. bezel assembly.
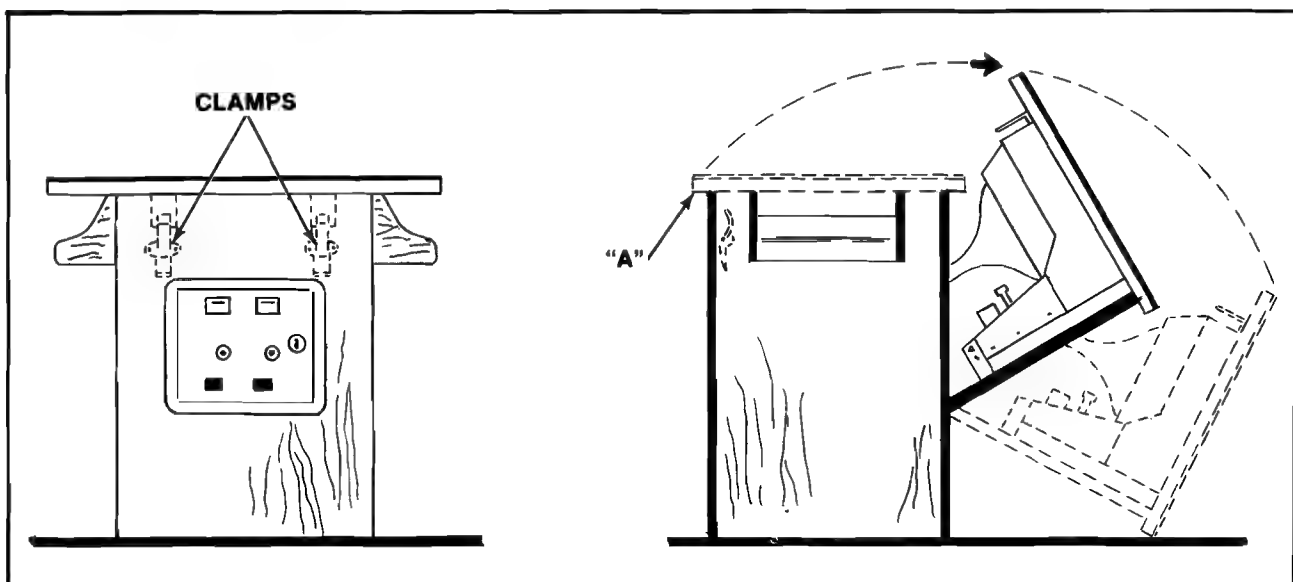
Figure 17 Opening the Cocktail game

- Completely disconnect the T.V. monitor from all its cabling. DON'T FORGET THE CHASSIS GROUND WIRE.

- Remove the screws holding the T.V. monitor chassis to the "L" by the door hinge(s). See Figure 18.

- Close the Cocktail Table top and re-latch it.

- Remove the screws which secure the T.V. monitor mounting brackets to the edges of the slot cut in the table top. See Figure 18.

- Pry up the end of each monitor mounting bracket with a screwdriver or similar tool until you can grasp them both.

- Lift the T.V. monitor straight up and out of the table top being VERY CAREFUL not to bump the neck of the picture tube.

- To reinstall the T.V. monitor, reverse this procedure.

- Be sure to check the clearance of the "L" brackets BEFORE setting the monitor into the table top.

- After replacing the T.V. monitor, be sure to run the game Self-Test.
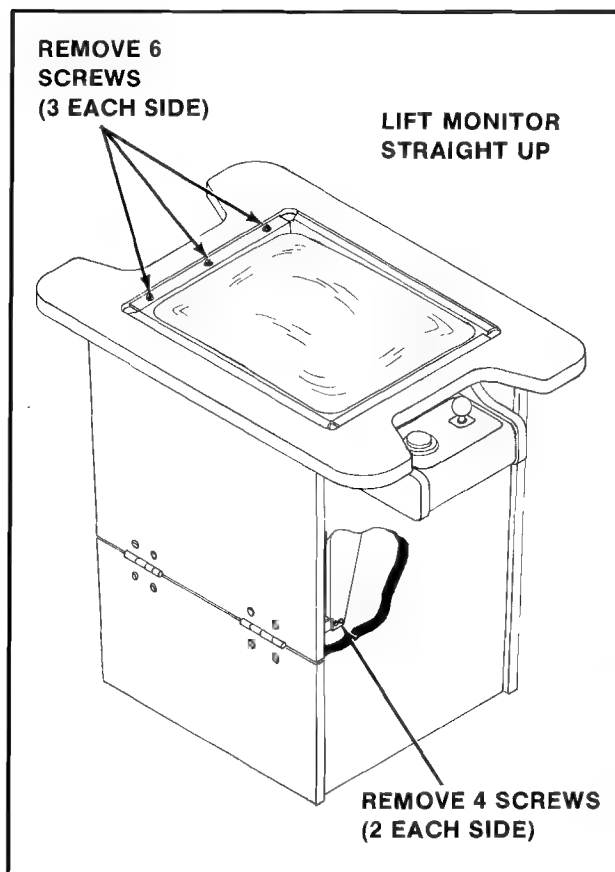
Figure 18 Replacing monitor — Cocktail game

PRINTED CIRCUIT BOARD (P.C.B.) REPLACEMENT

1. UPRIGHT MODEL: See Figure 19.

- Turn the power to the game off.

- Unlock and open the rear access door.

- Disconnect the video board from all its cabling.

- Disconnect the CPU board from all its cabling.

- Slide the P.C.B. clamps to one side, remove the P.C.B.'s from the card rack and take them out the back of the cabinet.

- Disconnect the power supply board from all its cabling, remove the P.C.B. supports indicated in Figure 19, and slide it out the back of the cabinet.

- To reinstall the above P.C.B.'s, reverse this procedure.

NOTE: P.C.B.'s are all keyed and will **ONLY** fit into their connectors one way without forcing them. The plugs on the cable harness which connect it to the P.C.B.'s are also keyed and will **ONLY** go onto their connectors one way without forcing them.

2. MINI MODEL: See Figure 19.

- Turn the power off to the game.

- Unlock and open the rear access door.

- Disconnect the video board from all its cabling.

- Disconnect the CPU board from all its cabling.

- Slide the P.C.B. clamps to one side, remove the P.C.B.'s from the card rack and take them out the back of the cabinet.

- Disconnect the power supply board from all its cabling, remove the P.C.B. supports indicated in Figure 19, and slide it out the back of the cabinet.

- To reinstall the above P.C.B.'s, reverse this procedure.

3. COCKTAIL TABLE MODEL: See Figure 19.

- Turn the power off to the game.

- Open the cabinet:
  Open the coin box door and release the two latches indicated in Figure 17.

CAUTION: The right hand latch is very close to the HIGH VOLTAGE on the monitor.

  Once they're released, unhook them from their latch plates.

- Grasp the table top at "A" and open it as indicated in Figure 17.

POWER SUPPLY P.C.B.

REMOVE THIS SUPPORT TO SLIDE P.C.B. OUT

REMOVE THIS SUPPORT TO SLIDE P.C.B. OUT

POWER SUPPLY P.C.B.

MINI

REMOVE (2) SUPPORTS TO SLIDE P.C.B. UP

POWER SUPPLY P.C.B.

UPRIGHT

COCKTAIL
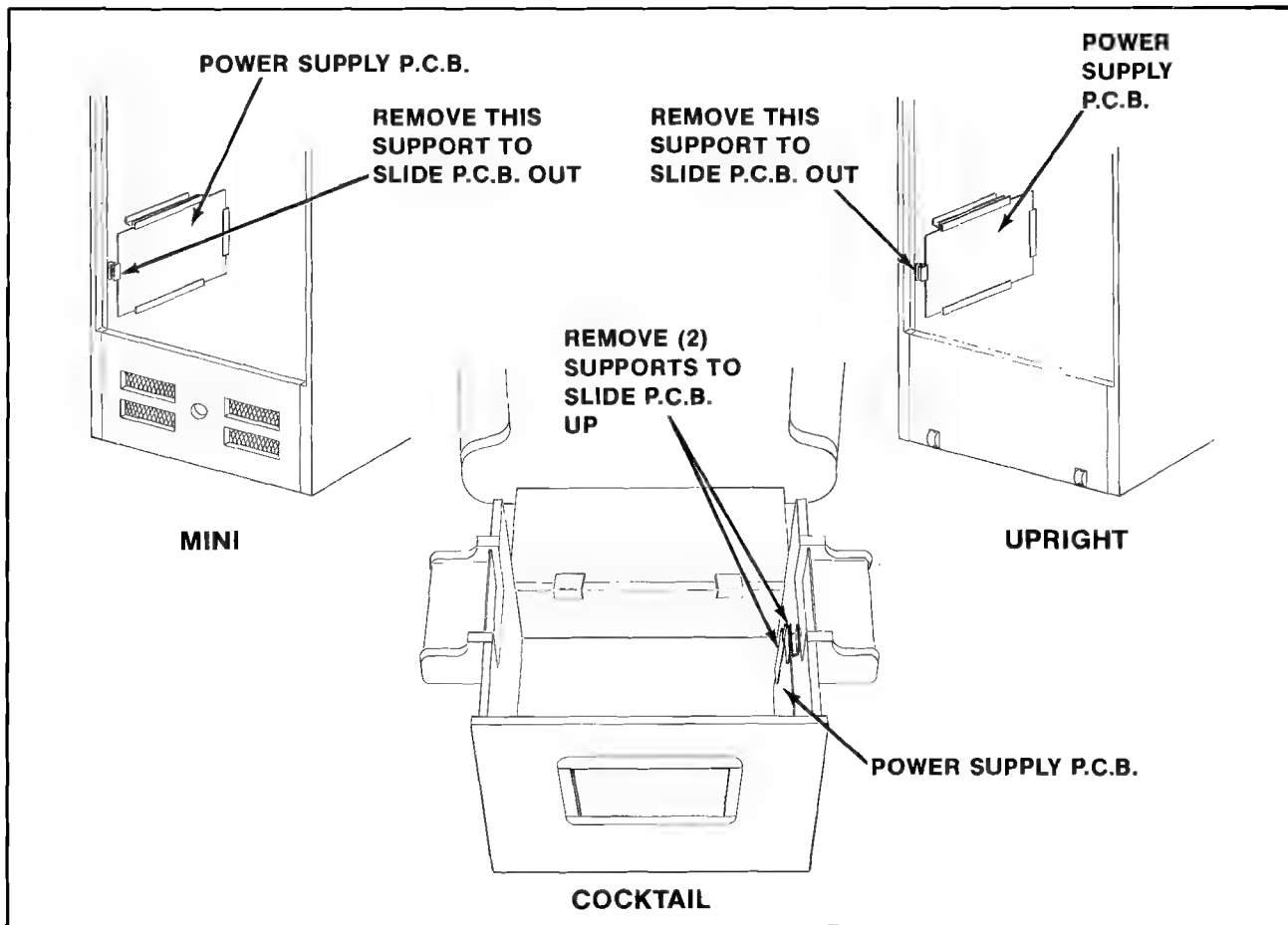
Figure 19 Power supply replacement

VIDEO BOARD (NOT SEEN)
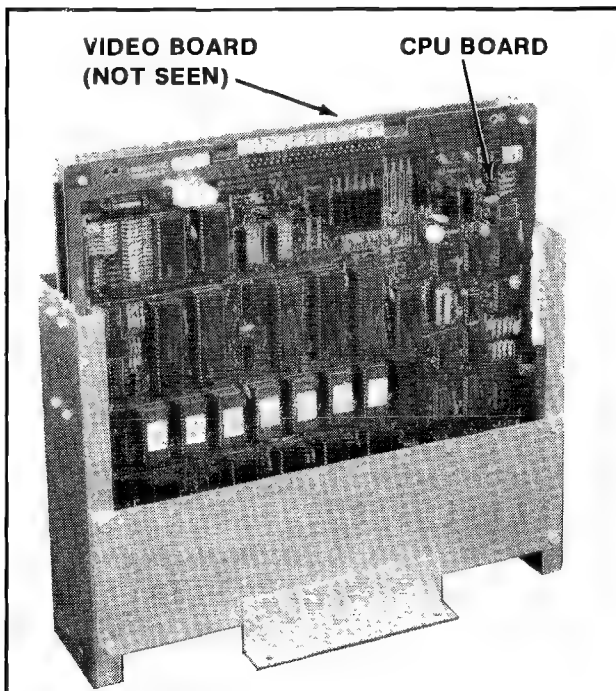
CPU BOARD

Figure 20 Removing Video & CPU boards from card rack

CAUTION: Due to the weight of the monitor, EXTREME CARE MUST be taken when opening the cabinet.

- To remove the power supply board. See Figure 19.

  Disconnect it from all its cabling.

  Remove the two smallest P.C.B. supports.

  Once these are removed, the power supply can be lifted out the top of the cabinet.

  To reinstall the power supply board, reverse this procedure.

- To remove the video and CPU boards. See Figure 20.

  Disconnect the video board from all its cabling.

  Disconnect the CPU board from all its cabling.

  Slide the P.C.B. clamps to one side, remove the P.C.B.'s from the card rack and lift them out the top of the cabinet.

  To reinstall the video and CPU boards, reverse this procedure.

OPENING THE ATTRACTION PANEL

1. UPRIGHT MODEL: See Figure 21.

- Turn the power to the game off.

- Opening the attraction panel:

  Remove the screws which secure the top bracket in place. (They are on its top side.) See Figure 21.

  Remove the top bracket and slide up the attraction panel. This exposes the attraction panel fluorescent light tube and its mounting bracket assembly. See Figure 21.

  To reinstall the attraction panel, reverse this procedure.

- The fluorescent light tube may be replaced at this time. BE CAREFUL NOT TO DROP IT.

WARNING: If you drop a fluorescent tube and it breaks, IT WILL IMPLODE! Shattered glass can fly six (6) feet or more from the implosion. Use care when replacing any fluorescent tube.

- Replacing the fluorescent tube starter. See Figure 22.

  Be sure the power to the game has been turned off.

  Grasp the starter (it is on the back of the mounting bracket), give it a quarter turn, and remove it from its socket.

  To replace the fluorescent light tube starter, reverse this procedure.

- Replacement of the fluorescent tube mounting bracket assembly. See Figure 23.

  Be sure the power is off to the game.

  Disconnect it from its power cable.

  Remove the screws at its right and left hand sides which secure it and gently slide it out the front of the cabinet, being careful not to catch its power cable on anything.

To reinstall the fluorescent tube mounting bracket assembly, reverse this procedure.

- Replacing the speaker. See Figure 24.

  Be sure the power is off to the game.

  Remove the attraction panel and disconnect the speaker from its cabling.

  Remove the nuts and bolts which secure the speaker and speaker grill in place and set them and the speaker grill aside.

  Once the bolts which secure the speaker in place are removed, the speaker may be removed through the opening where the attraction panel was.

  Reverse this procedure to reinstall the speaker.
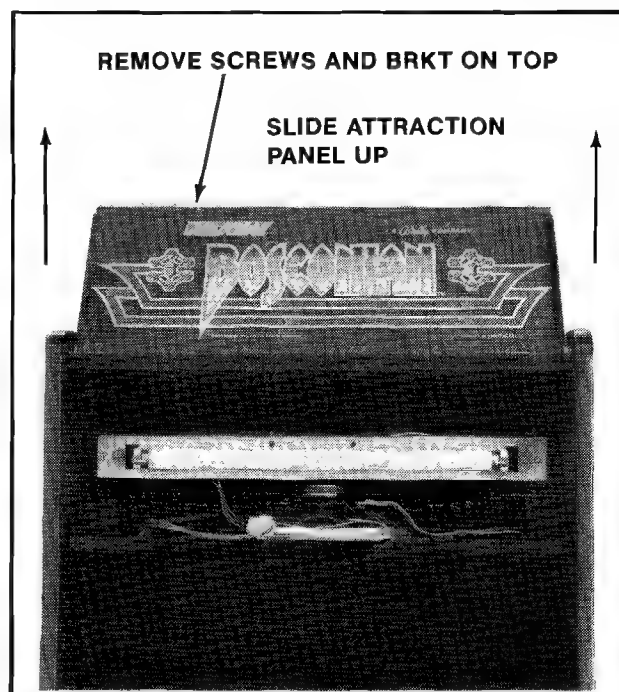
Figure 21 Opening the attraction panel — Upright game
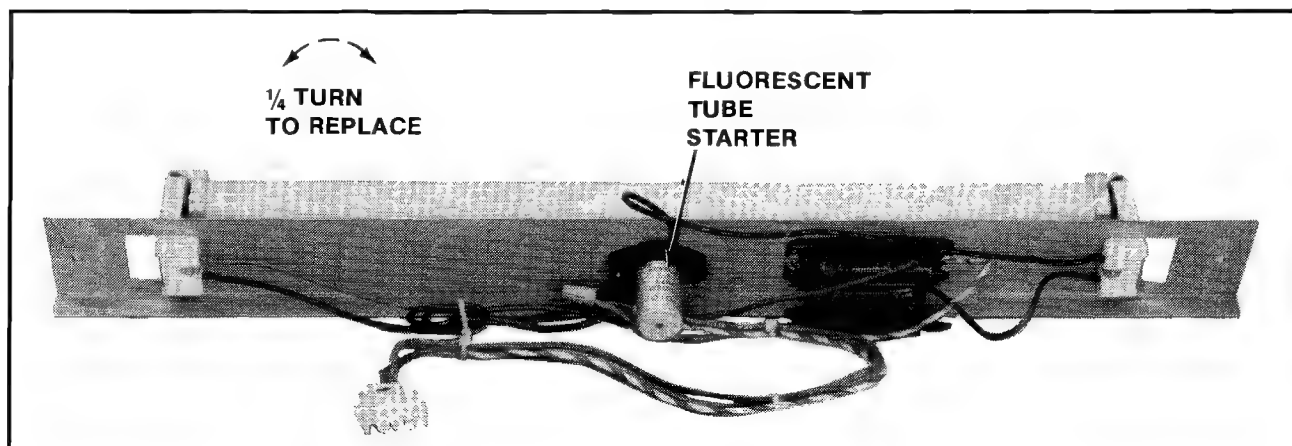
Figure 22 Replacing fluorescent starter — Upright game

SCREWS FOR LIGHT BRKT
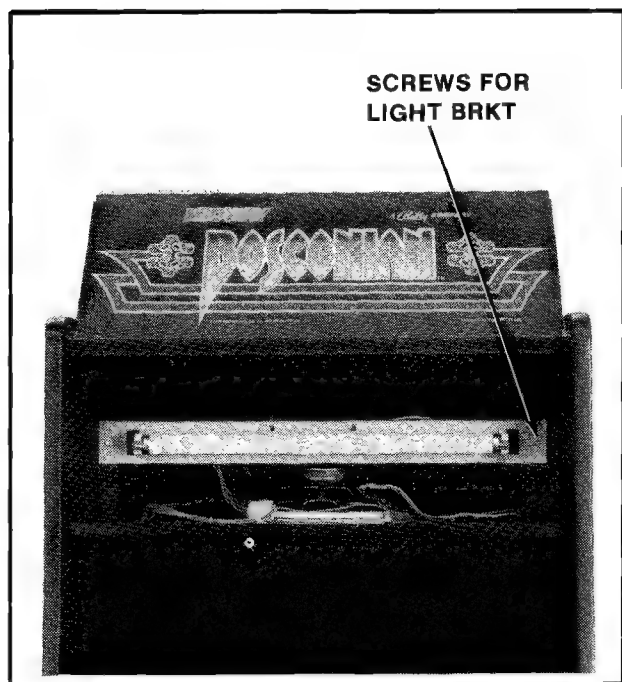
Figure 23 Replacing fluorescent tube mounting bracket — Upright game

REMOVE SPEAKER FROM FRONT OF GAME
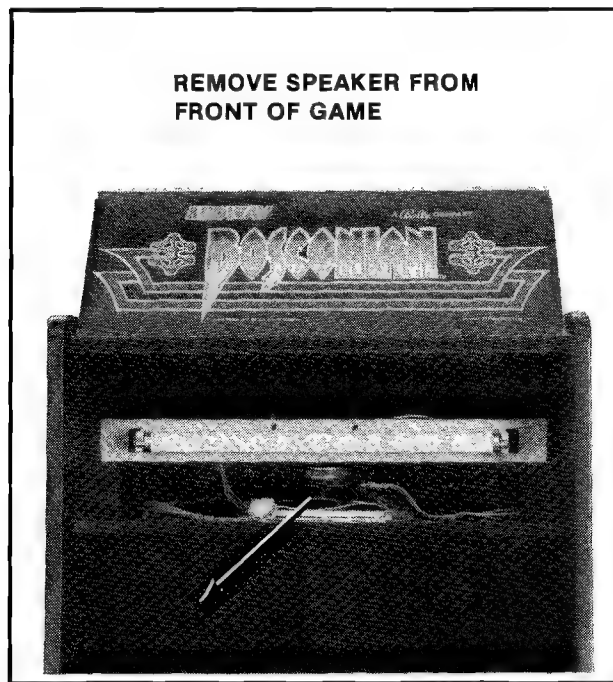
Figure 24 Replacing speaker — Upright game

PULL ATTRACTION PANEL AWAY FROM GAME

REMOVE SCREWS FROM TOP & BOTTOM BRACKETS (USE SPECIAL WRENCH SHIPPED WITH YOUR GAME)
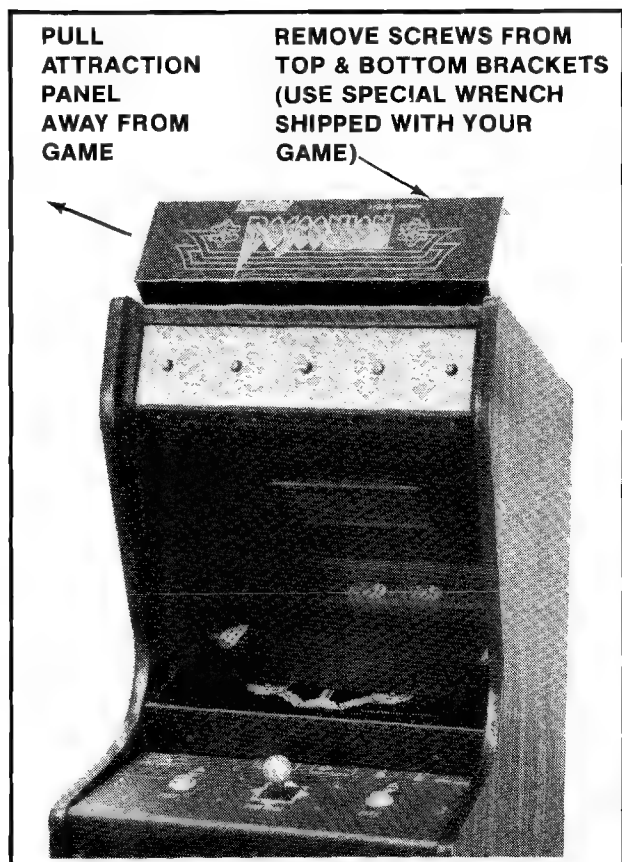
Figure 25 Opening the attraction panel — Mini game

2. **MINI MODEL:** See Figure 25.

- Turn the power off to the game.
- Remove the screws from the top and bottom of the formed attraction panel.
- Remove the formed attraction panel by pulling it straight away from the cabinet. This exposes the attraction panel light bulbs and their mounting board.
- To service the light bulbs and their mounting board:

  Turn the power to the game back on so you can see which bulbs are burnt out.

  Mark the burnt out bulbs and turn the power to the game back off again.

  To replace the burnt out bulbs, grasp them gently and pull straight out.

  The new bulbs are gently pushed into the empty sockets.

  To completely replace the light bulb mounting board:

  Open the cabinet rear access door and unplug the mounting board from its power cable.

  Remove the screws that hold the mounting board to the cabinet.

  Gently slide the mounting board out the front of the cabinet being careful not to catch its cable on anything.

  To reinstall the above removed items, reverse this procedure.

- To replace the speaker. See Figure 26.
  Be sure the power is off to the game.
  Disconnect the speaker from its cabling.
  Remove the nuts and bolts securing the speaker.
  Slide the speaker out through the rear access door.
  To reinstall the speaker, simply reverse this procedure.

3. THE COCKTAIL TABLE MODEL HAS NO BACK-LIT ATTRACTION PANEL

REMOVE SPEAKER FROM REAR OF GAME
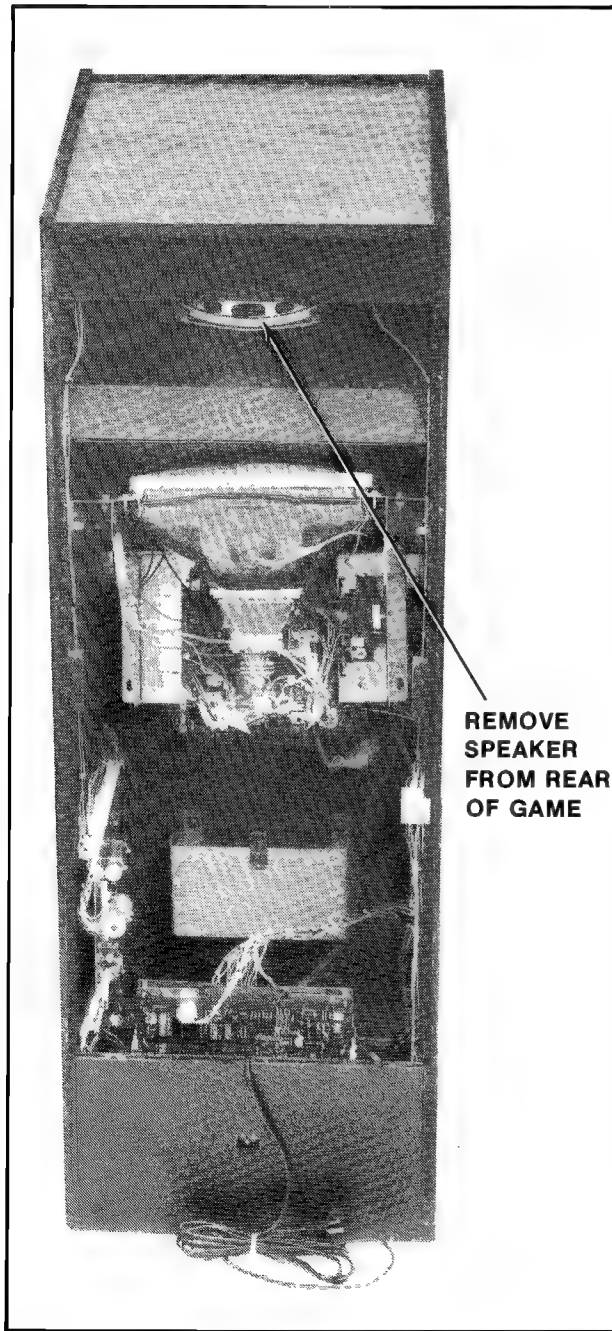
Figure 26 Replacing speaker — Mini game

COIN DOOR MAINTENANCE

METAL COIN ACCEPTOR MECHANISMS

Periodically, the metal coin acceptor mechanism(s) must be removed from the coin door and cleaned.

1. Make sure the power to the game is off.

2. Unlock and open the coin door.

3. Remove the coin acceptor mechanism as shown in Figure 27.
   - Push down on the two spring loaded latches.
   - While holding the latches down, pull the top of the coin acceptor mechanism toward you.
   - Release the latches and lift out the coin acceptor mechanism.

4. Clean the magnet of all foreign particles. See Figure 28.
   - This may be accomplished by swinging the gate open as shown in the above figure.

5. Remove the cradles and undersize levers and clean the bushings. (A pipe cleaner makes a good bushing cleaner.)
   - Also clean the pivot pin.

6. Whenever needed, the coin acceptor should be cleaned with hot water and cleanser in the following manner:
   - Place the coin acceptor in boiling water for about ten minutes.

CAUTION: BE CAREFUL NOT TO BURN YOURSELF.

- Next, use a brush and kitchen cleaner to remove all remaining foreign matter from the unit.
- Rinse the coin acceptor in clean boiling water.
- Dry the coin acceptor thoroughly by using filtered compressed air to blow it dry.

NOTE: The reason we recommend using boiling water is that it evaporates faster than cold water and speeds drying time.

7. To lubricate the coin acceptor:
   - Use **ONLY** powdered graphite and put it **ONLY** on the moving parts of the coin acceptor. These parts are called out in Figure 29.
   - Be extremely careful to keep the powdered graphite away from paths that are traveled by the coins.

WARNING
DO NOT USE OIL
TO LUBRICATE THE
COIN ACCEPTOR.
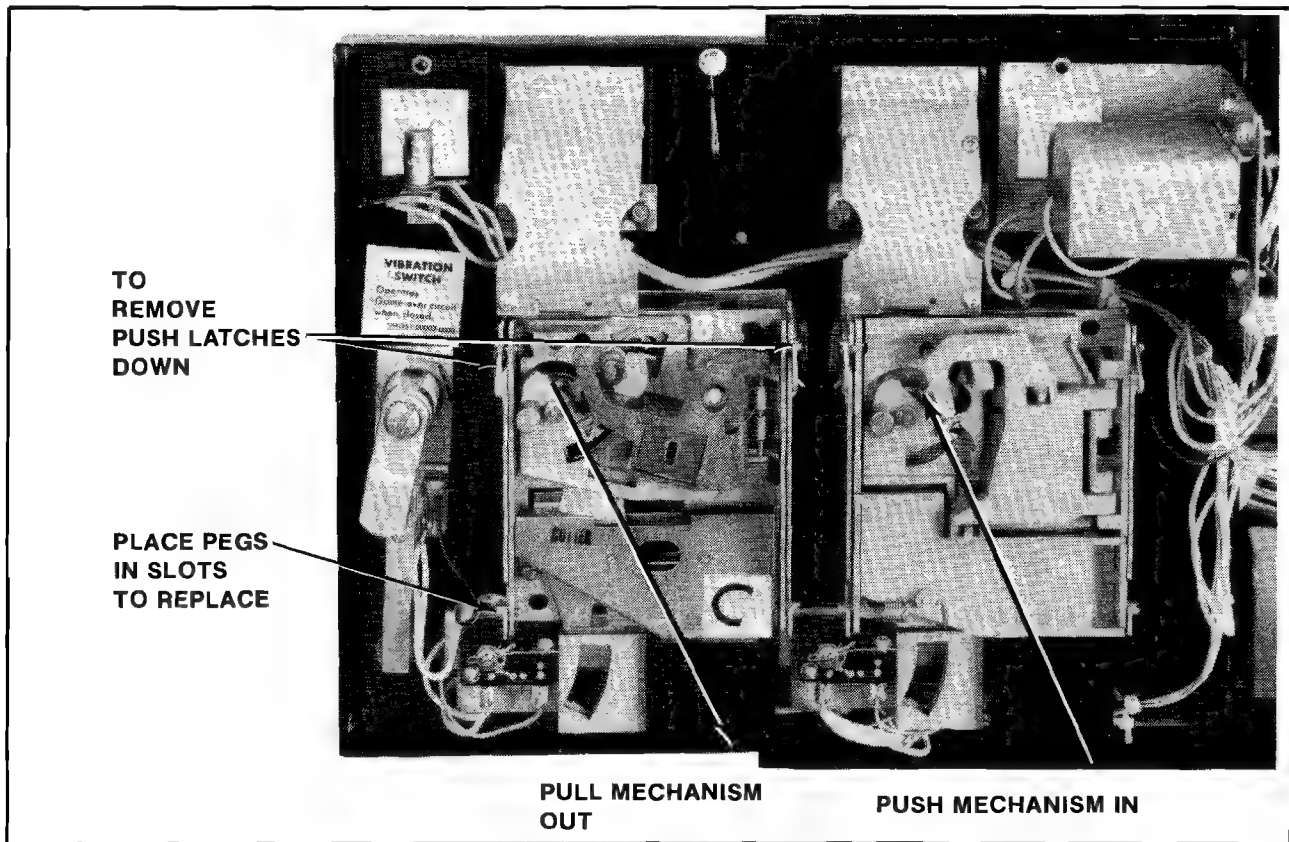
Figure 27 Removing and replacing coin acceptors

8. Check the coin chute for obstructions such as: paper, gum, etc.

9. Reinstall the coin acceptor to the coin door. See Figure 27.
   - Place the two pegs at the coin acceptor's base into their retaining slots.
   - Now push the top of the coin acceptor toward the coin door until it snaps in place and is held there by the two spring loaded latches.

10. Close and lock the coin door.

PLASTIC COIN ACCEPTOR MECHANISMS

The plastic coin acceptor mechanism(s) must be removed periodically from the coin door and cleaned.

1. Make sure the power to the game is off.

2. Unlock and open the coin door.

3. Remove the coin acceptor mechanism(s) as shown in Figure 27.
   - Push down on the two spring loaded latches.
   - While holding the latches down, pull the top of the acceptor mechanism toward you.
   - Release the latches and lift out the mechanism.
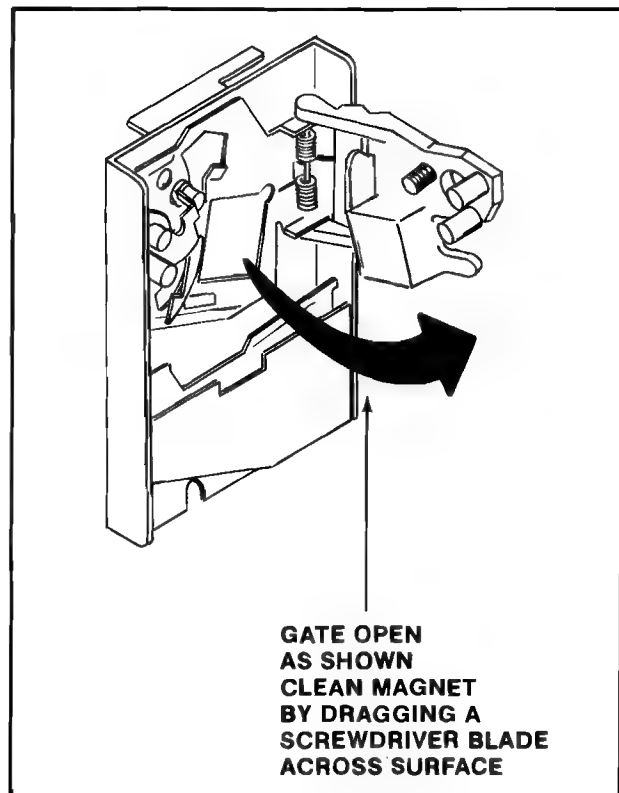
Figure 28 Opening the metal coin acceptor

APPLY POWDERED
GRAPHITE HERE

UNDERSIZE
LEVER

"E" RINGS

CRADLE
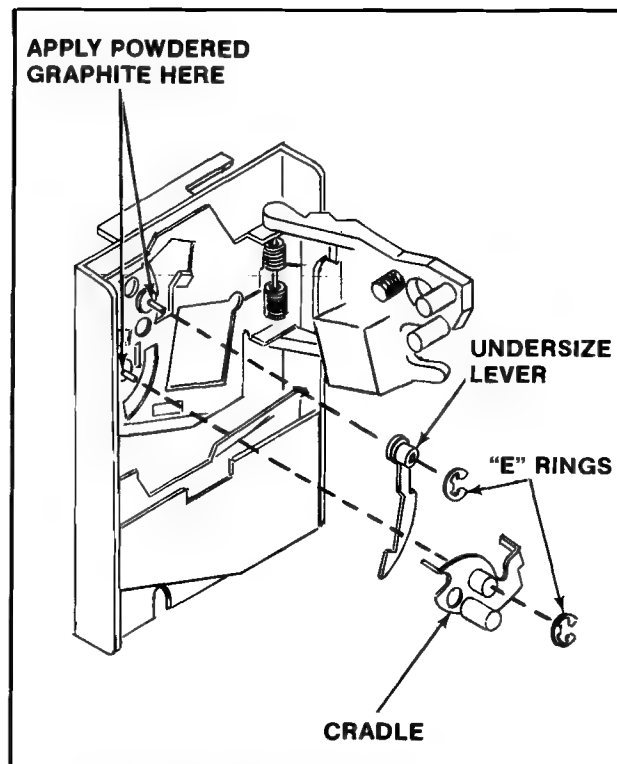
Figure 29 Lubricating the metal coin acceptor

4. Squeeze the two pins indicated in Figure 30 together to open the mechanism and break it down into its three basic parts.
   - Clean the mechanism in hot soapy water. It never rusts.
   - Rinse the mechanism in clean hot water and allow it to dry.
   - Reassemble the mechanism (it never needs lubrication).

5. Check the coin chute for obstructions such as: paper, gum, etc.

6. Reinstall the coin acceptor to the coin door. See Figure 27.
   - Place the two pegs at the coin acceptor's base into their retaining slots.
   - Now push the top of the coin acceptor toward the coin door until it snaps in place and is held there by the two spring loaded latches.

7. Close and lock the coin door.

NOTE: See Figure 31 for instructions on how to set the plastic coin acceptor mechanisms to either accept or reject Canadian quarters.

SQUEEZE PINS TOGETHER
TO UNLOCK

SWING BOTH GATES OPEN

HOLDING BOTH GATES TOGETHER,
PUSH UP AND PULL OUT
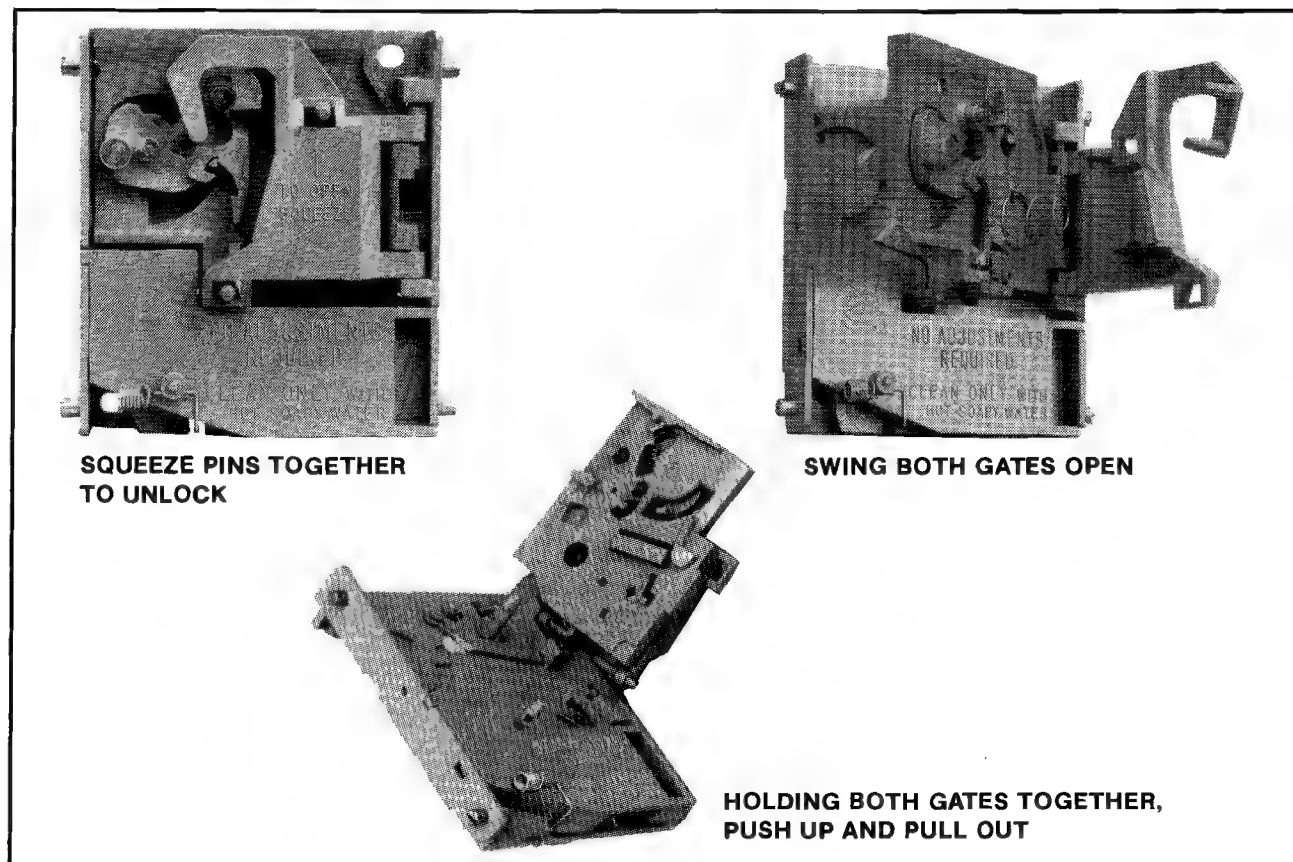
Figure 30 Opening the plastic coin acceptor
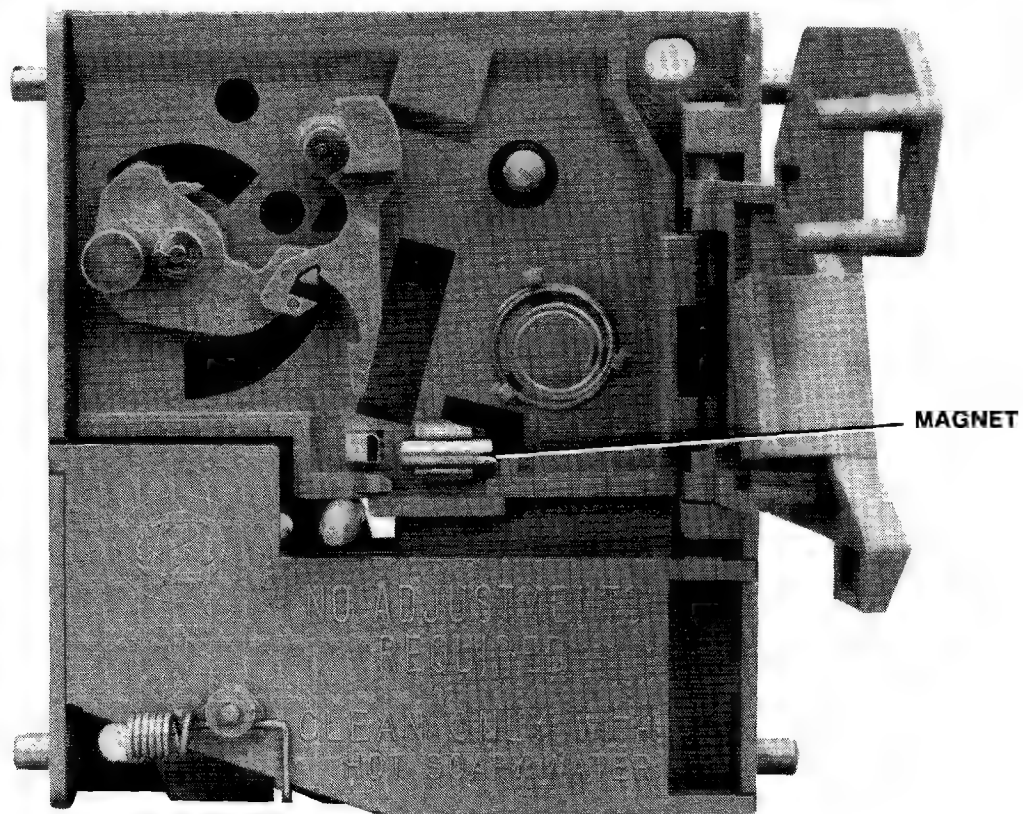
MAGNET

ACCEPTOR CAN BE SET TO ACCEPT U.S. QUARTERS
ONLY OR BOTH U.S. AND CANADIAN QUARTERS.

SLIDE MAGNET TO EXTREME RIGHT (AS SHOWN) TO
ACCEPT BOTH U.S. AND CANADIAN QUARTERS.

TO ACCEPT U.S. QUARTERS ONLY, SLIDE MAGNET TO
EXTREME LEFT.

Figure 31 Changing the plastic coin acceptor to accept American or Canadian quarters

IV Illustrated Parts Breakdown

NO. 550— BOSCONIAN UPRIGHT — HEADER FLUORESCENT FIXTURE ASSY. — PARTS LIST

*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
1	0508-00103-0000	FLUORESCENT BRKT.
2	0017-00003-0043	18" COOL WHITE FLUOR. LAMP
3	0017-00021-0005	FLUORESCENT LOCKS (2 REQ'D.)
4	0017-00031-0036	FLUORESCENT SOCKET (2 REQ'D.)
5	0017-00003-0412	FLUOR. STARTER HOLDER W/WIRE LEADS
	0017-00101-0573	#6-32 x 1/2 PHIL. RND. HD. M.S. (4 REQ'D.)
	0017-00104-0009	#6 EXT. WASHER (4 REQ'D.)
6	0017-00003-0019	FLUOR. STARTER
7	0017-00003-0026	BALLAST
	0017-00101-0598	#8-32 x 5/16 SLT. HEX HD. SCR. (4 REQ'D.)
8	A508-00017-0000	FLUORESCENT CABLE ASSY.
	A961-00042-0000	LINE FILTER ASSY. — NOT SHOWN

*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
1	0550-00901-00XF	DECORATIVE HEADER PLEXI — 23″ x 8-15/16″ x 3/16″
2	0537-00903-0057	GLASS CHANNEL — 7-5/8″ LG. (2 REQ'D.)
3	0508-00104-00XF	UPPER/LOWER HEADER RETAINER (2 REQ'D.)
	0017-00101-0138	#8 x 5/8 TORX TAMPER RESISTANT BLK. SCR. (6 REQ'D)
	0017-00009-0522	LONG ARM KEY T-20 (FOR ABOVE SCREW)
4	A508-00007-0000	HEADER FLUORESCENT LIGHT ASSY.
5	0017-00009-0393	SPEAKER GRILLE — BLACK W/SLOTS
	0017-00003-0259	6″ x 9″ SPEAKER 8 OHM, 7W.
	0017-00101-0136	#8-32 x 1-1/4 CARRIAGE BOLT (4 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D.)
6	0508-00900-0000	19″ T.V. BEZEL
7	0508-00905-0000	T.V. PLEXI-GLASS (GRAYLITE #31) — 17-3/8″ x 13-1/4″ x 1/8″
	0508-00901-0000	PLEXI-GLASS CLIPS (4 REQ'D.)
	0017-00101-0017	#6 x 1/2 SLT. HEX HD. BLK. SCR. (4 REQ'D.)
8	0550-00900-00XF	MAIN VIEWING GLASS — 23″ x 21-1/8″ x 3/16″
	0508-00108-0000	GLASS STOP BRKT. — CABINET REAR
	0017-00101-0027	#8 x 3/4 SLT. HEX HD. M.S. (3 REQ'D.)
9	0550-00903-0000	DECAL — SIDE
10	0550-00904-0000	DECAL — FRONT
11	A550-00009-0000	STRIKE TO CONTROL PANEL ASSY.
	0508-00115-0000	CENTER CONTROL SHELF LOCK BRKT.
	0961-00115-00XF	STRIKE (2 REQ'D.)
	0017-00101-0620	#8-32 x 1/2 CARRIAGE BOLT (10 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (12 REQ'D.)
	0017-00009-0033	LATCH CLAMP (3 REQ'D.)
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. M.S. (6 REQ'D.)
	0550-00101-0100	CONTROL SHELF MTG. BRKT. — RIGHT
	0550-00101-0200	CONTROL SHELF MTG. BRKT. — LEFT
	0555-00901-0000	LOCATING PIN (4 REQ'D.)
12	0550-00902-0000	CONTROL SHELF OVERLAY — DECORATIVE
13	A557-00006-0000	CONTROL ASSY.
14	0017-00042-0256	PUSH BUTTON ASSY. — RED (2 REQ'D.)
	0017-00032-0093	PUSH BUTTON SWITCH W/HOLDER (2 REQ'D.)
	0017-00103-0054	5/8-11 PAL NUT (2 REQ'D.)
15	0017-00032-0051	SMALL RED PUSH BUTTON SWITCH (2 REQ'D.)
16	A090-00300-07BK	U.S.A. 25¢ DOUBLE COIN DOOR ASSY.
17	0090-00002-04BK	LARGE BLACK DOUBLE COIN DOOR FRAME
	0017-00101-0121	#6-32 x 5/16 PHIL. TRS. HD. SCR. (3 REQ'D.)
		(MOUNTS COIN DOOR TO FRAME)
18	0935-00906-0100	KICK PLATE — 23 ″ LG.
19	0017-00102-0048	3/8-16 x 2″ LEG LEVELERS (4 REQ'D.)
	0017-00103-0026	3/8-16 LEG LEVELER HEX NUTS (4 REQ'D.)
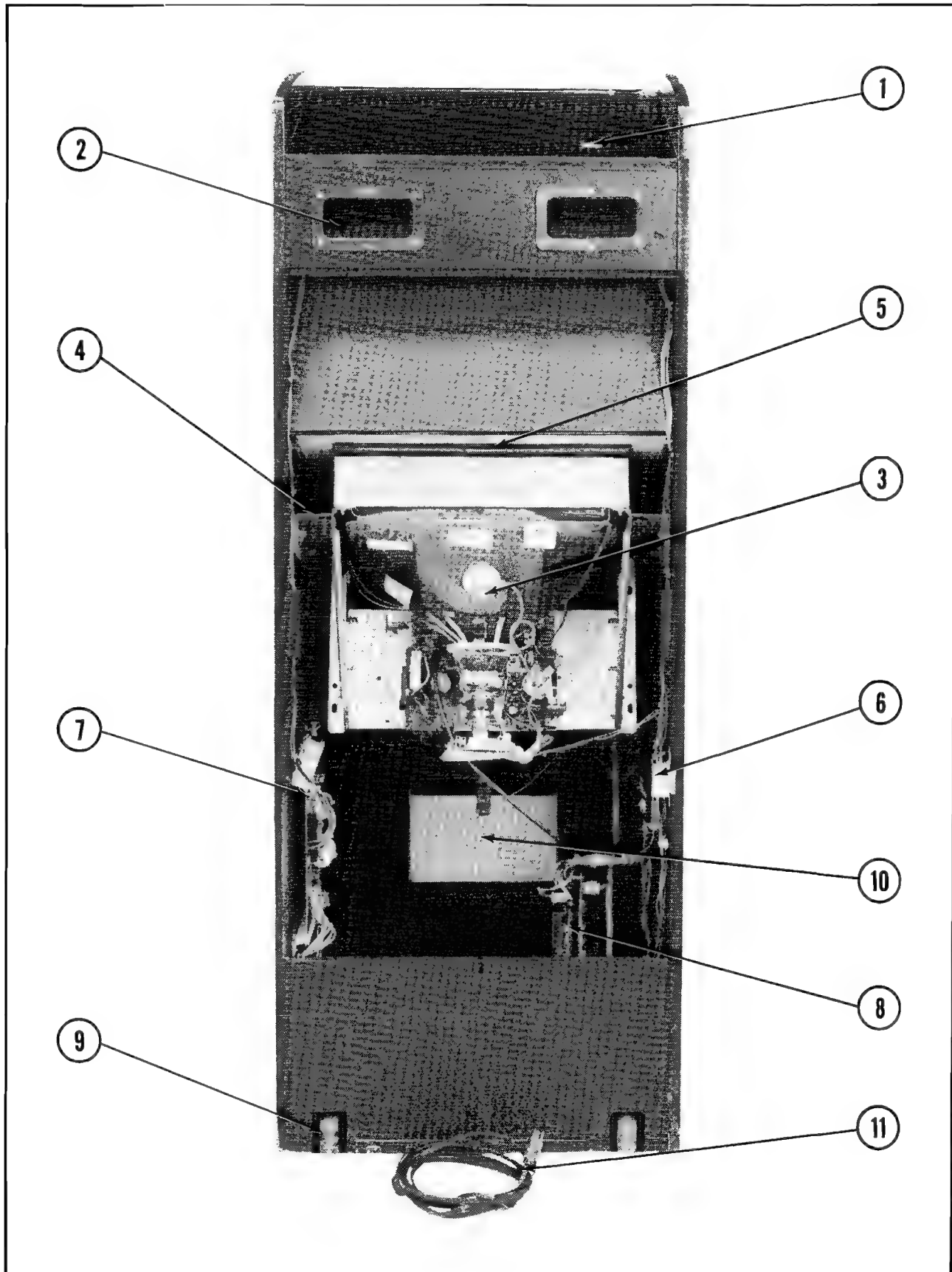
ITEM	PART NO.	DESCRIPTION
1	A088-00013-0000	ON-OFF SWITCH & BRKT. ASSY.
2	0894-00916-0000	RECESSED HAND LIFT (2 REQ'D.)
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. SCREW (12 REQ'D.)
3	0017-00003-0339	ELECTROHOME — 19" COLOR DUAL SYNC HORIZ. MTG. MONITOR (OR)
3	0017-00003-0418	WELLS-GARDNER — 19" COLOR DUAL SYNC HORIZ. MTG. MONITOR
4	0550-00100-0000	MONITOR RAIL (2 REQ'D.)
	0017-00102-0006	1/4-20 x 3/4 SQR. NECK BOLT (4 REQ'D.)
	0017-00104-0014	7/8" DISH WASHER (4 REQ'D.)
	0017-00103-0018	1/4-20 HEX NUT (4 REQ'D.)
	0017-00101-0141	#8 x 11/16 UNSLOT, HEX HD. M.S. (8 REQ'D.)
	0555-00901-0000	LOCATING PIN (4 REQ'D.)
5	0508-00900-0000	T.V. BEZEL
6	A088-00015-0000	INTERLOCK SWITCH & BRKT. ASSY.
7	A082-90420-B000	5V/4A POWER SUPPLY P.C. ASSY.
	0624-00902-0100	P.C. SUPPORT BRKT. — 12" LG. (2 REQ'D.)
	0624-00902-0300	P.C. SUPPORT BRKT. — 2-1/2" LG.
	0624-00902-0500	P.C. SUPPORT BRKT. — 6-1/2" LG.
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. M.S. (10 REQ'D.)
	0017-00104-0037	#8 FLAT WASHER (10 REQ'D.)
8	A550-00017-0000	CARD RACK W/P.C. BOARDS ASSY.
9	A961-00007-0000	CASTER ASSY. (2 REQ'D.)
	0961-00109-0000	WHEEL BRKT. (2 REQ'D.)
	0017-00042-0255	PLASTIC WHEEL (2 REQ'D.)
	0894-00702-00XF	SHAFT (2 REQ'D.)
	0017-00100-0037	3/8" E-RING (2 REQ'D.)
10	A950-00004-0000	COIN BOX ASSY.
	A950-00006-0000	COIN BOX CRADLE ASSY.
	0950-00105-0000	COIN BOX COVER
	0950-00104-0000	COIN BOX HANDLE
	0950-00101-0000	COIN DEFLECTOR (2 REQ'D.)
	0950-00900-0000	LARGE PLASTIC CASH BOX
	0017-00101-0142	1/4-20 x 1-3/8 RND. HD. BOLT BLK. (4 REQ'D.)
	0017-00104-0014	7/8" DISH WASHER (4 REQ'D.)
	0017-00103-0018	1/4-20 HEX NUT (4 REQ'D.)
11	A866-00049-0000	LINE CORD ASSY.
	ADDITIONAL PARTS LIST	
	A550-00013-0000	TRANSFORMER BOARD ASSY.
	A097-00008-0000	BACK DOOR LOCK ASSY.
	0017-00009-0490	5-5/8" SQR. VENT GRILLE (4 REQ'D.)
	3010-03003-0000	GROUNDING CLIP
	A508-00024-0000	VIDEO SIGNAL CABLE ASSY.
	A508-00034-0000	AUDIO ADAPTER CABLE ASSY.
	A508-00035-0000	VIDEO SIGNAL ADAPTER CABLE ASSY.
	A550-00011-0000	CONTROL SHELF CABLE ASSY.
	A550-00016-0000	MASTER CABLE ASSY.
	A508-00026-0000	COIN DOOR CABLE ASSY.
	A508-00014-0000	HIGH VOLTAGE CABLE ASSY.
	A508-00015-0000	LOW VOLTAGE CABLE ASSY.
	A082-91410-A000	RAPID FIRE P.C. BOARD ASSY.
	0017-00101-0018	#6 x 3/4 SLOT HEX HD. SCREW (4 REQ'D.)
	0508-00106-0000	T.V. BEZEL MTG. BRKT. (2 REQ'D.)
	0508-00108-0000	MAIN VIEWING GLASS STOP BRKT.
	0017-00101-0027	#8 x 3/4 SLT. HEX HD. M.S. (3 REQ'D.)
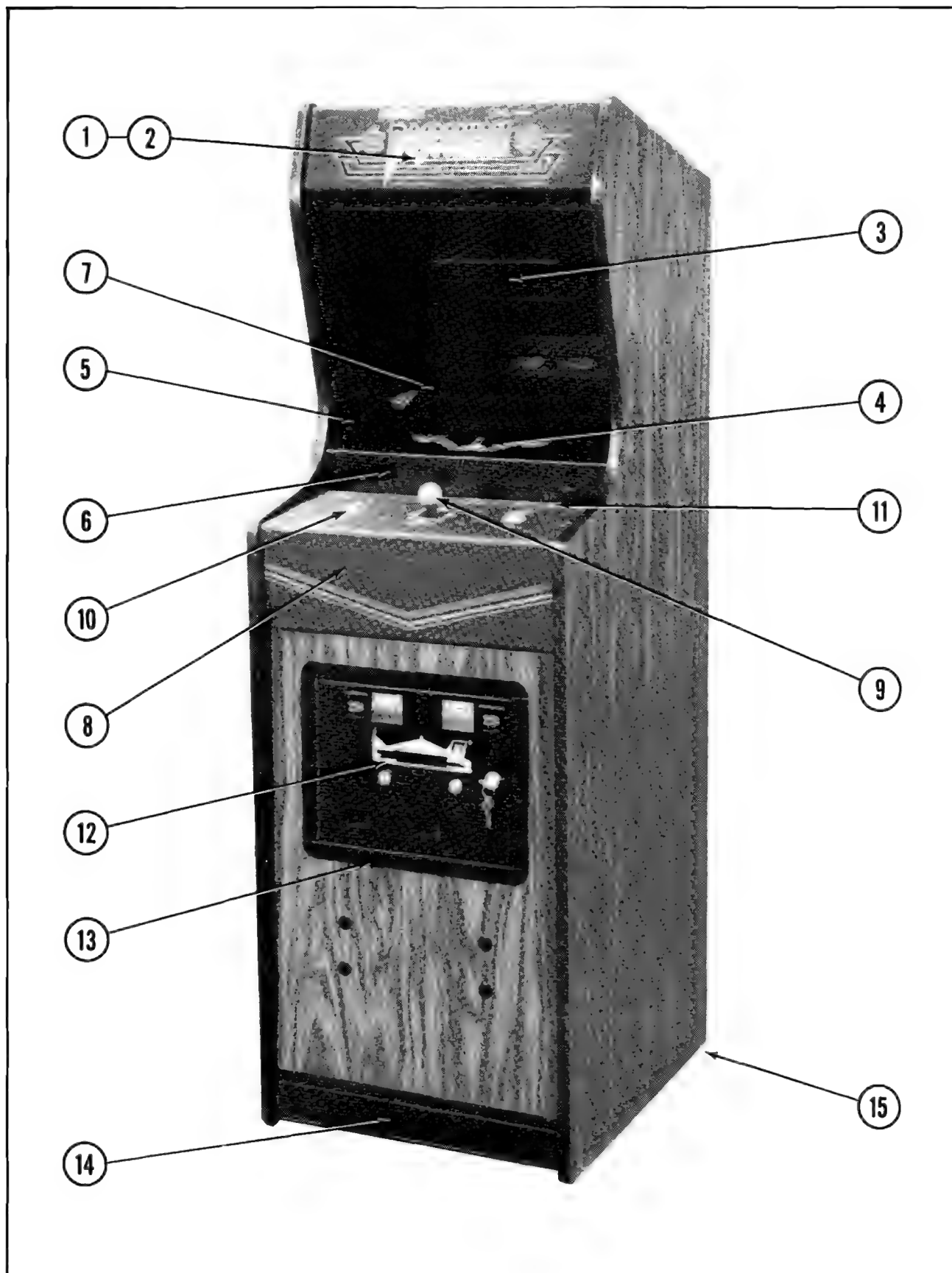
*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
1	0555-00900-00XF	HEADER DISPLAY PANEL
	0017-00101-0138	#8 x 5/8 TORX TAMPER RESISTANT SCREW (8 REQ'D.)
	0017-00009-0522	LONG ARM KEY T-20 (FOR ABOVE SCREW)
2	A555-00007-0000	INSERT DISPLAY ASSY.
	0017-00031-0030	WEDGE BASE LIGHT SOCKET (5 REQ'D.)
	0017-00003-0219	#194 LAMP 14V., .27A. (5 REQ'D.)
	A514-00015-0000	INSERT DISPLAY CABLE ASSY.
3	0017-00009-0393	BLACK SPEAKER GRILLE W/SLOTS
	0017-00003-0259	6" x 9" SPEAKER — 8 OHM, 7W.
	0017-00101-0127	#8-32 x 1-1/2 CARRIAGE BOLT (4 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D.)
4	0555-00902-00XF	MAIN GLASS — 17-13/16" x 14-13/16" x 3/16"
5	0537-00903-0056	GLASS CHANNEL — 14-1/2" LG. (2 REQ'D.)
6	A555-00016-0000	GLASS CLAMPING PLATE ASSY.
	0017-00101-0138	#8 x 5/8 TORX TAMPER RESISTANT SCR. (2 REQ'D.)
7	A555-00005-0000	T.V. BEZEL ASSY.
	0931-00903-0000	T.V. BEZEL
	0934-00905-0000	PLEXI-GLASS (TINTED)
	A961-00026-0000	BEZEL MTG. BRKT. ASSY.
8	A555-00015-0000	OVERLAY/CONTROL PLATE ASSY.
	0555-00102-0000	CONTROL SHELF PLATE
	0555-00903-0000	CONTROL SHELF DECORATIVE OVERLAY
	0017-00101-0620	#8-32 x 1/2 CARRIAGE BOLT (8 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (8 REQ'D.)
	A555-00013-0000	CONTROL SHELF CABLE ASSY.
	0555-00101-0100	CONTROL SHELF MTG. BRKT. — RIGHT
	0555-00101-0200	CONTROL SHELF MTG. BRKT. — LEFT
	0555-00901-0000	LOCATING PIN (4 REQ'D.)
	0961-00115-00XF	STRIKE (2 REQ'D.)
	0017-00009-0033	LATCH CLAMP (2 REQ'D.)
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. M.S. (8 REQ'D.)
9	A557-00006-0000	CONTROL ASSEMBLY
10	0017-00042-0256	PUSH BUTTON ASSY. — RED (2 REQ'D.)
	0017-00032-0093	PUSH BUTTON SWITCH W/HOLDER (2 REQ'D.)
	0017-00103-0054	5/8-11 PAL NUT (2 REQ'D.)
11	0017-00032-0051	SMALL RED SWITCH BUTTON W/HARDWARE (2 REQ'D.)
12	A090-00300-07BK	U.S.A. 25¢ DOUBLE COIN DOOR ASSY.
13	0090-00002-04BK	LARGE BLACK DOUBLE COIN DOOR FRAME
	0017-00101-0121	#6-32 x 5/16 PHIL. TRS. HD. SCR. (3 REQ'D.)
		(MOUNTS COIN DOOR TO FRAME)
	A508-00026-0000	COIN DOOR CABLE ASSY.
14	0935-00906-0400	KICK PLATE — 17-15/16" LG.
15	0017-00102-0048	3/8-16 x 2" LEG LEVELERS (4 REQ'D.)
	0017-00103-0026	3/8-16 LEG LEVELER HEX NUTS (4 REQ'D.)
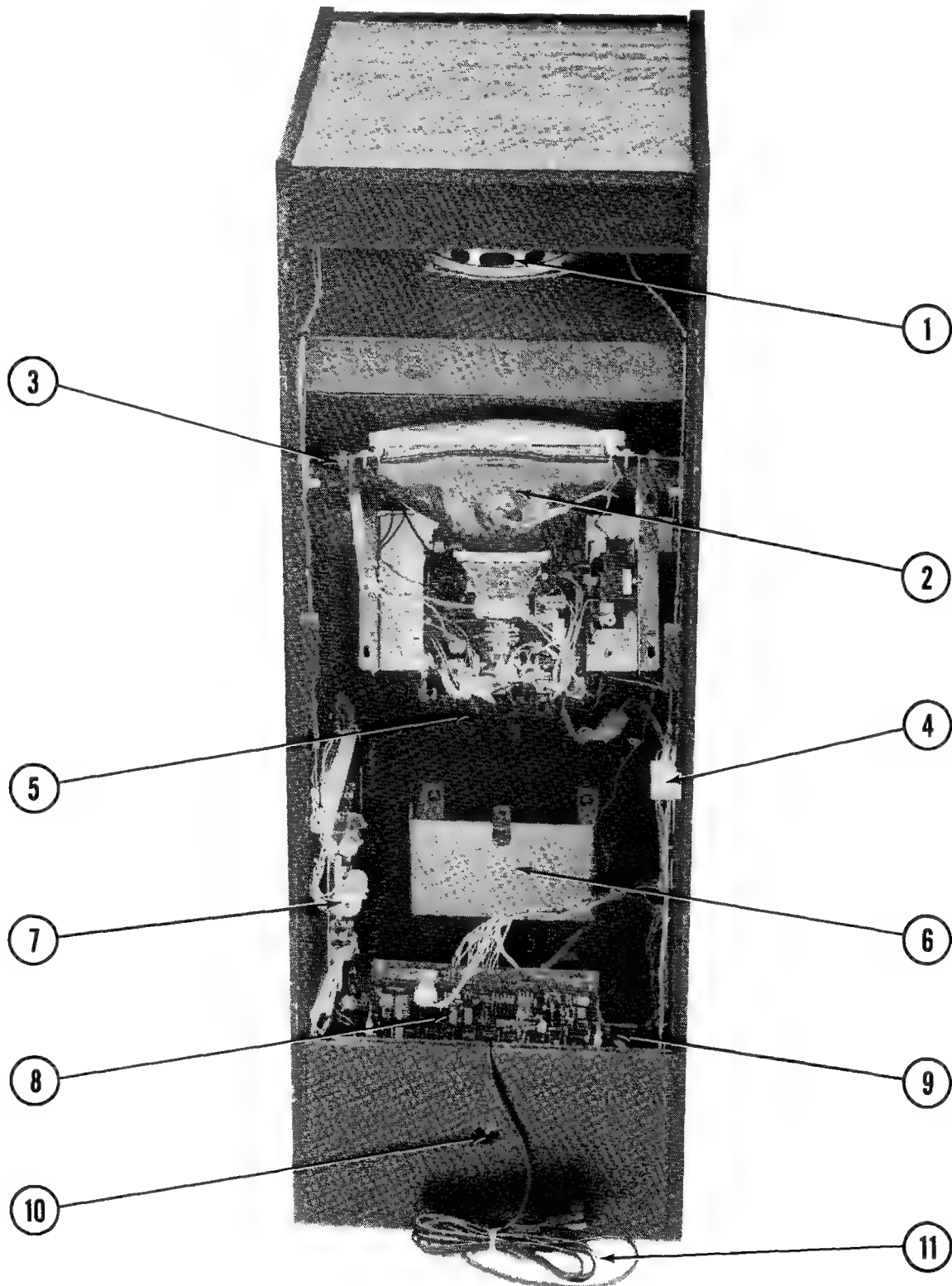
*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
1	0017-00003-0259	6" x 9" SPEAKER 8 OHM, 7W.
2	0017-00003-0340	ELECTROHOME — 13" COLOR DUAL SYNC HORIZ. MTG. MONITOR (OR)
2	0017-00003-0396	WELLS-GARDNER — 13" COLOR DUAL SYNC HORIZ. MTG. MONITOR
3	A926-00012-00XF	T.V. MTG. BRKT. ASSY.
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. M.S. (2 REQ'D.)
	0555-00100-0000	MONITOR MTG. BRKT. (2 REQ'D.)
	0017-00102-0066	1/4-20 x 3/4 UNSLOT. HEX HD. BOLT (4 REQ'D.)
	0017-00104-0014	7/8" DISH WASHER (4 REQ'D.)
	0017-00103-0018	1/4-20 HEX NUT (4 REQ'D.)
4	A088-00015-0000	INTERLOCK SWITCH & BRKT. ASSY.
5	A090-00300-07BK	DOUBLE ENTRY COIN DOOR ASSY.
6	A950-00004-0000	COIN BOX ASSY.
	A950-00006-0000	COIN BOX CRADLE ASSY.
	0950-00105-0000	COIN BOX COVER
	0950-00104-0000	COIN BOX HANDLE
	0950-00101-0000	COIN DEFLECTOR (2 REQ'D.)
	0950-00900-0000	LARGE PLASTIC COIN BOX
	0017-00101-0142	1/4-20 x 1-3/8 RND. HD. BOLT (4 REQ'D.)
	0017-00104-0014	7/8" DISH WASHER (4 REQ'D.)
	0017-00103-0018	1/4-20 HEX NUT (4 REQ'D.)
7	A082-90420-B000	5V/4A POWER SUPPLY P.C. ASSY.
	0624-00902-0100	P.C. SUPPORT BRKT. — 12" LG. (2 REQ'D.)
	0624-00902-0300	P.C. SUPPORT BRKT. — 2-1/2" LG.
	0624-00902-0500	P.C. SUPPORT BRKT. — 6-1/2" LG.
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. M.S. (10 REQ'D.)
	0017-00104-0037	#8 FLAT WASHER (10 REQ'D.)
8	A550-00017-0000	CARD RACK W/P.C. BOARDS ASSY.
9	A555-00009-0000	TRANSFORMER BOARD ASSY.
10	A088-00013-0000	ON/OFF SWITCH & BRKT. ASSY.
11	A866-00049-0000	LINE CORD ASSY.
		ADDITIONAL PARTS LIST
	A097-00008-0000	BACK DOOR LOCK ASSY.
	0017-00009-0490	5-5/8" SQR. VENT GRILL — BACK DOOR (4 REQ'D.)
	A514-00011-0000	HIGH VOLTAGE CABLE ASSY.
	A555-00011-0000	LOW VOLTAGE CABLE ASSY.
	A555-00012-0000	MASTER CABLE ASSY.
	A508-00034-0000	AUDIO ADAPTER CABLE ASSY.
	A508-00035-0000	MONITOR SIGNAL ADAPTER CABLE ASSY.
	A508-00024-0000	VIDEO SIGNAL CABLE ASSY.
	3010-03003-0000	GROUND CLIP
	A082-91410-A000	RAPID FIRE P.C. BOARD ASSY.
	0017-00101-0018	#6 x 3/4 SLOT. HEX HD. SCREW (4 REQ'D.)

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	0017-00009-0499	COVER GLASS — 32" x 22" x1/4"
	0557-00903-0000	ARTWORK UNDERLAY
2	0775-00104-00XF	GLASS CLIPS (8 REQ'D.)
	0017-00101-0117	#8 x 5/8 PHIL. TRS. HD. SCR. (16 REQ'D.)
3	0508-00905-0000	T.V. PLEXI-GLASS (GRAYLITE #31) — 17-3/8" x 13-1/4" x 1/8"
	0508-00901-0000	PLEXI-GLASS MTG. CLIPS (4 REQ'D.)
	0017-00101-0017	#6 x 1/2 SLT. HEX HD. SCR. (4 REQ'D.)
4	0557-00900-0000	T.V. BEZEL
5	A557-00007-0100	CONTROL SHELF ASSY. — PLAYER #1
6	A557-00007-0200	CONTROL SHELF ASSY. — PLAYER #2
7	0017-00009-0393	BLACK SPEAKER GRILLE W/SLOTS (3 REQ'D.)
	0017-00003-0187	6" x 9" SPEAKER 8 OHM, 9W.
	0017-00101-0136	#8-32 x 1-1/4 CARRIAGE BOLT (12 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (12 REQ'D.)
8	A090-00300-07BK	U.S.A. 25¢ DOUBLE COIN DOOR ASSY.
9	0090-00002-02BK	LARGE BLACK DOUBLE COIN DOOR FRAME
	0017-00101-0121	#6-32 x 5/16 PHIL. TRS. HD. SCR. (3 REQ'D.)
		(MOUNTS COIN DOOR TO FRAME)
10	0017-00102-0048	3/8-16 x 2" LEG LEVELERS (4 REQ'D.)
	0017-00103-0026	3/8-16 LEG LEVELER HEX NUTS (4 REQ'D.)
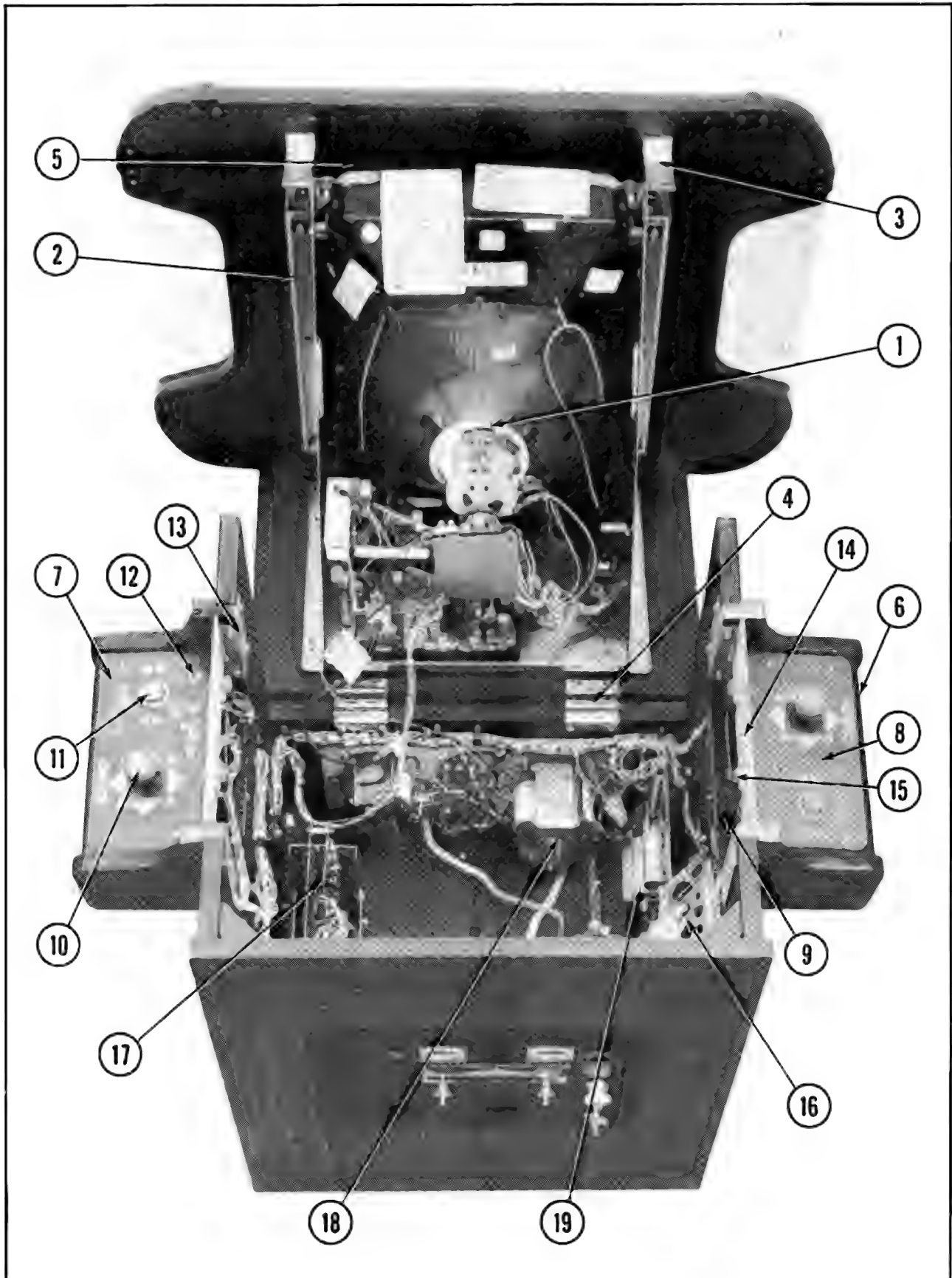
ORDER BY PART NUMBER *ONLY*

ITEM	PART NO.	DESCRIPTION
1	0017-00003-0428	WELLS-GARDNER — 19″ COLOR DUAL SYNC VERT. MTG. MONITOR
2	A557-00004-00XF	MONITOR MTG. BRKT. ASSY. (2 REQ'D.)
	0017-00101-0642	#8-32 x 1-1/2 CARRIAGE BOLT (4 REQ'D.)
	0017-00104-0031	#8 FLAT WASHER (4 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D.)
	0017-00102-0002	1/4-20 x 1/2 SLT. HEX HD. BOLT (6 REQ'D.)
	0017-00102-0052	1/4-20 x 1″ UNSLT. HEX FLAT HD. BOLT (6 REQ'D.)
	0017-00104-0014	7/8″ DISH WASHER (8 REQ'D.)
3	0921-00107-00XF	STRIKE (2 REQ'D.)
	0017-00101-0769	#10 x 3/4 SLT. HEX HD. M.S. (4 REQ'D.)
	0017-00009-0033	LATCH CLAMP (2 REQ'D.) — NOT SEEN
	0017-00101-0141	#8 x 11/16 UNSLOT HEX HD. SCREW (4 REQ'D.)
4	0017-00009-0514	2-1/2″ HINGE (2 REQ'D.)
	0017-00101-0628	#8-32 x 3/4 CARRIAGE BOLT (4 REQ'D.)
	0017-00101-0639	#8-32 x 1-1/4 CARRIAGE BOLT (4 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D.)
5	0557-00900-0000	T.V. BEZEL
6	0557-00102-00XF	CONTROL PANEL (2 REQ'D.)
7	0557-00902-0100	DECORATIVE OVERLAY — PLAYER #1
8	0557-00902-0200	DECORATIVE OVERLAY — PLAYER #2
	0017-00101-0620	#8-32 x 1/2 CARRIAGE BOLT (8 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (8 REQ'D.)
	0017-00101-0341	#6 x 1/4 PHIL. TRS. HD. SCR. (10 REQ'D.)
9	0510-00101-00XF	BOTTOM PAN (2 REQ'D.)
10	A557-00006-0000	CONTROL ASSY. (2 REQ'D.)
	A557-00014-0100	CONTROL SHELF CABLE ASSY. — PLAYER #1
	A557-00014-0200	CONTROL SHELF CABLE ASSY. — PLAYER #2
11	0017-00042-0256	RED PUSH BUTTON ASSY. (2 REQ'D.)
	0017-00032-0093	PUSH BUTTON SWITCH W/HOLDER (2 REQ'D.)
	0017-00103-0054	5/8-11 PAL NUT (2 REQ'D.)
12	0017-00032-0051	SMALL RED BUTTON SWITCH W/HARDWARE (2 REQ'D.) — PLAYER #1 PANEL ONLY
13	0930-00104-0000	CONTROL PANEL LOCATING BRKT. (4 REQ'D.)
	0017-00101-0025	#8 x 1/2 SLT. HEX HD. M.S. (16 REQ'D.)
14	0930-00904-0000	LIGHT SHIELD (2 REQ'D.)
15	0017-00031-0044	WEDGE BASE LAMP SOCKET (4 REQ'D.)
	0017-00003-0219	#194 LAMP 14V., .27A. (4 REQ'D.)
	0017-00101-0555	#6-32 x 5/16 SLT. HEX HD. M.S. (4 REQ'D.)
16	0017-00003-0187	6″ x 9″ SPEAKER 8 OHM, 9W.
17	A550-00017-0000	CARD RACK W/P.C. BOARDS ASSY.
18	A557-00010-0000	TRANSFORMER BOARD ASSY.
19	A082-90420-B000	5V/4A. POWER SUPPLY P.C. ASSY.
	0624-00902-0100	P.C. SUPPORT BRKT. — 12″ LG.
	0624-00902-0300	P. C. SUPPORT BRKT. — 2-1/2″ LG.
	0624-00902-0500	P.C. SUPPORT BRKT. — 6-1/2″ LG. (2 REQ'D.)
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. M.S. (14 REQ'D.)
	0017-00104-0031	#8 FLAT WASHER (14 REQ'D.)

*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
		ADDITIONAL PARTS LIST
	A775-00013-0000	FAN ASSEMBLY
	0151-00081-0000	4″ FAN
	0775-00110-00XF	FAN PLATE
	0749-00106-00XF	VENT SCREEN
	0017-00101-0347	#6-32 x 1/2 R.H.M.S. (4 REQ'D.)
	0017-00104-0009	#6 EXT. WASHER (4 REQ'D.)
	0017-00103-0005	#6-32 HEX NUT (4 REQ'D.)
	0017-00101-0026	#8 x 5/8 SLT. HEX HD. M.S. (4 REQ'D.)
	A082-91410-A000	RAPID FIRE P.C. BOARD ASSY.
	0017-00101-0018	#6 x 3/4 SLOT. HEX HD. SCREW (4 REQ'D.)
	A088-00013-0000	ON-OFF SWITCH & BRKT. ASSY.
	A927-00019-0000	COIN BOX ASSY.
	A962-00004-0000	COIN BOX COVER ASSY.
	A962-00005-0000	COIN BOX SIDE CHANNEL ASSY. — SHORT
	0962-00101-0000	COIN BOX SIDE CHANNEL — SHORT
	0017-00101-0628	#8-32 x 3/4 CARRIÁGE BOLT (4 REQ'D.)
	0017-00104-0022	#8 WASHER (4 REQ'D.)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D.)
	A088-00014-0000	INTERLOCK SWITCH & BRKT. ASSY.
	0927-00907-0000	HIGH VOLTAGE SHIELD — FORMED
	A557-00013-0000	MASTER CABLE ASSY.
	A510-00011-0000	HIGH VOLTAGE CABLE ASSY.
	A557-00012-0000	LOW VOLTAGE CABLE ASSY.
	A508-00026-0000	COIN COOR CABLE ASSY.
	A510-00014-0000	VIDEO SIGNAL CABLE ASSY.
	A508-00034-0000	AUDIO SIGNAL ADAPTER CABLE ASSY.
	A508-00035-0000	VIDEO SIGNAL ADAPTER CABLE
	A927-00005-0000	HIGH BASE LEG KIT ASSY. — OPTIONAL
	A866-00049-0000	LINE CORD ASSY.

BOSCONIAN — CARD RACK ASSY. W/BOARDS — ALL VERSIONS— PARTS LIST

*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
1	A084-91412-B550	CPU BOARD ASSY.
2	A084-91413-B550	VIDEO BOARD ASSY.
3	A935-00015-0000	HOLDER PLATE & STOP ASSY. (2 REQ'D.)
4	0017-00009-0478	NYLON GUIDE (4 REQ'D.)
5	0935-00103-0000	SIDE SUPPORT (2 REQ'D.)
6	0935-00102-0000	MOUNTING BRACKET (2 REQ'D.)
7	0017-00101-0096	#6 x 3/8 SLT. HEX HD. SCR. (14 REQ'D.)
	A084-91414-A550	FILTER BOARD ASSY. — MOUNTS ON TO CPU BOARD — NOT SHOWN
	0508-00116-0100	P.C. SUPPORT BRKT. — RIGHT — NOT SHOWN
	0508-00116-0200	P.C. SUPPORT BRKT. — LEFT — NOT SHOWN

BOSCONIAN — CONTROL ASSEMBLY — ALL VERSIONS — PARTS LIST

*ORDER BY PART NUMBER **ONLY***

ITEM	PART NO.	DESCRIPTION
1	A932-00022-0000	BALL & SHAFT ASSEMBLY
2	0017-00100-0025	1/4" E-RING
3	0921-00702-0000	STOP SPACER
4	0921-00902-0000	SLIDE PLATE
5	A557-00005-0000	SPOT WELD ASSEMBLY
6	0017-00101-0637	#8-32 x 1" CARRIAGE BOLT (4 REQ'D.)
7	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D.)
8	0932-00902-0000	GROMMET
9	0017-00101-0598	#8-32 x 5/16 SLT. HEX HD. M.S. (10 REQ'D.)
10	0962-00904-0000	SLEEVE
11	0017-00101-0527	#5-40 x 5/8 SLT. RND. HD. SCR. (8 REQ'D.)
12	0020-00202-0000	SWITCH PLATE (4 REQ'D.)
13	A932-00009-0000	SWITCH ASSEMBLY (4 REQ'D.)
14	A921-00009-0000	STOP PLATE & SWITCH BRKT. ASSY.
15	0927-00908-0000	WEAR PLATE
16	0921-00700-0000	ACTUATOR

BOSCONIAN — TRANSFORMER BOARD ASSY. — PARTS LIST
(NO PHOTOGRAPH)

ITEM	PART NO.	DESCRIPTION
	MT00-00082-0000	TRANSFORMER — 115/115V. — UPRIGHT & MINI
	MT00-00087-0000	POWER TRANSFORMER — 120/240V. — UPRIGHT & MINI
	MT00-00085-0000	TRANSFORMER — 115V., 50HZ — COCKTAIL ONLY
	MT00-00091-0000	SHIELDED TRANSFORMER — 115/220V. — COCKTAIL ONLY
	0017-00101-0628	#8-32 x 3/4 CARRIAGE BOLT (4 REQ'D.)
	0017-00103-0008	#8-32 HEX NUT (4 REQ'D.)
	0017-00101-0141	#8 x 11/16 UNSLOT. HEX HD. SCR. (15 REQ'D.)
	0720-00001-0300	3 POSITION FUSE CLIP ASSY. — UPRIGHT & COCKTAIL
	0720-00001-0200	2 POSITION FUSE CLIP ASSY. — MINI ONLY
	0720-00001-0100	1 POSITION FUSE CLIP ASSY.
	0017-00003-0004	SLO-BLO FUSE — 2A., 250V. (2 REQ'D.)
	0017-00003-0002	SLO-BLO FUSE — 1/2 A., 250V. — COCKTAIL & UPRIGHT
	0017-00003-0217	SLO-BLO FUSE — 2-1/2A., 125V.
	A508-00037-0000	2 LEAD XFRMR BRD. FILTER ASSY.
	3010-13106-0000	TERMINAL STRIP
	0017-00021-0370	MALE CONNECTOR — 5 PAIR
	3000-17246-0100	GROUND STRAP — COCKTAIL
	3000-17246-0500	5-1/2" GROUND STRAP — MINI
	3000-17246-0700	20" GROUND STRAP — UPRIGHT & MINI
	3000-17246-0800	23" GROUND STRAP — COCKTAIL
	3000-17246-0900	48" GROUND STRAP — UPRIGHT
	3000-17246-1000	36" GROUND STRAP — MINI & COCKTAIL

FRONT DOOR ASSEMBLY — U.S.A. 25¢
ORDER BY PART NUMBER ONLY

ITEM	PART NO.	DESCRIPTION
1	0090-00002-02BK	DOUBLE ENTRY COIN DOOR FRAME
2	0017-00101-0121	#6-32 x 5/16 PHIL. TRS. HD. SCR. (3 REQ'D.)
3	A090-00073-02BK	DOUBLE ENTRY COIN DOOR W/DRESS PLATE
4	0017-00101-0123	#8 x 1/4 UNSLOT. HEX HD. SCREW (4 REQ'D.)
5	0017-00007-0019	KEY HOOK
6	0017-00101-0552	#6-32 x 1/4 CARRIAGE BOLT (4 REQ'D.)
7	0090-00117-03XF	COIN ENTRY PLATE — 25¢ (2 REQ'D.)
8	A097-00005-0000	DOOR LOCK & KEY W/SCREW & NUT (OR)
8	A097-00006-0000	DOOR LOCK & KEY W/SCREW & NUT
9	0090-00128-00XF	DOOR TILT SWITCH BRKT.
10	0017-00005-0041	DOOR CAM
11	A090-00095-0000	DOOR TILT SWITCH
12	0090-00126-01XF	SWITCH BACK-UP PLATE
13	0017-00101-0525	#5-40 x 9/16" PHIL. HD. M.S. (2 REQ'D.)
	A090-00096-0000	DOOR TILT SWITCH & BRKT. ASSY. (ITEMS 9 & 11 THRU 13)
14	0090-00903-9500	25¢ WINDOW (2 REQ'D.)
15	0090-00143-00XF	COIN PLEX RETAINER
16	0017-00003-0219	12 VOLT LAMP — G.E. #1895 (2 REQ'D.)
17	0017-00031-0048	BAYONET SOCKET W/BRKT. (2 REQ'D.)
18	0017-00104-0002	#6 SPLIT LOCK WASHER (8 REQ'D.)
19	0017-00103-0084	#6-32 HEX NUT W/SEMS (4 REQ'D.)
20	A090-00057-0000	COIN METER
21	0017-00101-0124	#6 x 1/4 UNSLOT. HEX HD. SCR. (8 REQ'D.)
22	0017-00032-0051	PUSH BUTTON SWITCH
23	0017-00032-0007	SLIDE SWITCH
24	0017-00072-0034	STEEL OVAL HD. RIVET
25	0090-00173-0000	COIN COUNTER MTG. BRKT.
	A090-00082-0000	TEST SWITCH & BRKT. ASSY. (ITEMS 23 THRU 25)
26	A090-00087-0000	COIN CHUTE & TOP ASSY. (2 REQ'D.)
27	0010-00134-0000	SPRING
28	0010-00181-0000	SPRING
29	0017-00007-0083	1/8 x 1-5/8 ROLL PIN
30	0090-00129-00XF	PIVOT POST
31	0090-00167-00XF	PIVOT LEVER
32	0093-00155-00XF	REJECT LEVER
33	0017-00100-0018	E-RING
	A090-00088-0000	REJECT LEVER ASSY. (2 REQ'D.) (ITEMS 30 THRU 33)
34	A090-00085-0000	COIN ACCEPTOR FRAME ASSY. (2 REQ'D.)
35	0017-00005-0003	COIN ACCEPTOR W/STRING CUTTER (2 REQ'D.) (OR)
35	0017-00005-0211	COIN ACCEPTOR W/ANTI STRING DEVICE (2 REQ'D.) (OR)
35	0017-00005-0214	COIN ACCEPTOR W/STRING CUTTER (2 REQ'D.)
36	A090-00064-0000	ANTI-PENNY DEVICE
37	0017-00101-0099	#6 x 1/4 SLT. HEX HD. M.S. (2 REQ'D.)
38	0090-00162-00XF	COIN SWITCH MTG. BRKT.
39	0017-00005-0203	COIN SWITCH CHUTE
40	0017-00005-0195	COIN SWITCH
41	0010-00599-0000	COIN SWITCH WIRE
42	0017-00007-0132	PUSH-ON RING
	A090-00059-0400	COIN SWITCH & WIRE ASSY. (ITEMS 40 THRU 42)
43	0017-00101-0698	#4-40 x 3/4 SLT. RND. HD. M.S. (2 REQ'D.)
	A090-00077-0000	COIN GUIDE & SWITCH ASSY. (ITEMS 38 THRU 43)

V Technical Troubleshooting

Troubleshooting

Introduction

The most common problems occur in harness components such as the coin acceptor, player controls, interconnecting wiring, etc. The TV monitor and PCB computer cause their share of problems too, but not as much as the harness and its component parts. TV monitor troubleshooting will not be covered here because it is covered in that section of this manual.

As you already know, the PCB computer is a complex device with a number of different circuits. Some circuits remain basically the same among games, but overall there are a great many differences between them. PCB troubleshooting procedures, therefore, can be lengthy and will differ greatly among games. However, some basic Z-80 CPU information is involved in this section.

General Suggestions

The first step in any troubleshooting procedure is correctly identifying the malfunction's symptoms. This includes not only the circuits or features malfunctioning, but also those still operational. A carefully trained eye will pick up other clues as well. For instance, a game in which the computer functions fail completely just after money was collected may have a quarter shorting the PCB traces. Often, an experienced troubleshooter will be able to spot the cause of the problem even before opening the cabinet.

After all the clues are carefully considered, the possible malfunctioning areas can be narrowed down to one or two good suspects. Those areas can be examined by a process of elimination until the cause of the malfunction is discovered.

Harness Component Troubleshooting

Typical problems falling in this category are coin and credit problems, power problems and failure of individual features.

NO GAME CREDIT

For example, your prospective player inserts his quarter and is not awarded a game. The first item to check is if the quarter is returned. If the quarter is returned, the malfunction most certainly lies in the coin acceptor itself. First, use a set of test coins (both old and new) to ascertain that the player's coin is not undersize or underweight. If your test coins are also returned, coin acceptor servicing is indicated. Generally, the cause of this particular problem is a maladjusted magnet gate. Normally, this will mean slightly closing the magnet gate a little by turning the adjusting screw out a bit (see section on coin acceptor for more details).

If the quarter is not returned and there is no game credit, the cause of the malfunction may be in one of several areas. First try operating the coin return button; if the coin is returned, the problem is most likely in the magnet gate. Enlarge the gap according to the coin acceptor service procedures. If this does not cure the problem, remove the coin acceptor, clean it and perform the major adjustment procedure.

If the trapped coin is not returned when the wiper lever is actuated, you may have an acceptor jammed by a slug, gummed up with beer, a jammed coin chute, or mechanical failure of the acceptor mechanism. In this case, first check for the slug that will generally be trapped against the magnet. If so, simply remove the slug and test the acceptor. If the chute is blocked, remove the acceptor and remove the jammed coins. If there is actual failure of the acceptor, remove the unit and repair as indicated in the coin acceptor service procedures.

If the coin is making its way through the acceptor (that is, falling into the coin box), yet there is still no game credit, you either have a mechanical failure of the coin switch or electrical failure of the coin and credit circuits. The first place to begin is by checking the coin switch. Most of these switches are the make/break variety of micro switch, which is checked by testing for continuity between the NO, NC, and C terminals. When not actuated, the NC and C terminals should be continuous and the NO terminal open. When operated, the NO and C terminals should close and the NC should be open. If the coin switch checks out, examine the connections to the terminals to make sure there is good contact. If necessary, use the continuity tester and check from the terminal lug on the switch to the associated PCB trace. This will tell you if there is a continuous line all the way to the credit circuit.

If the coin switch wires do not check out, the problem is in the computer — most likely in the coin and credit circuitry.

If you do get game credit when a coin is deposited, but the game will not start when the start switch is pressed, you may have a problem in the start switch, the interconnecting wiring or in the computer. First check the switch. If the switch is OK, proceed to check the wiring. Again, make sure you go from the terminal lug on the switch to the PCB trace. This way, you will check the terminal contact as well as PCB edge connector contact. If the wiring is continuous, proceed to check the PCB credit circuit. If not, check each section of the wiring, until the discontinuity is located. If the wiring is OK, the problem must lie in the computer.

Transformer and Line Voltage Problems

Your machine must have the correct line voltage to operate properly. If the line voltage drops too low, a circuit in the computer will disable game credit. The point at which the computer will fail to work will vary some from game to game, but no game will work on line voltage that drops below 105 VAC.

Low line voltage may have many causes. Line voltage normally fluctuates a certain amount during the day as the total usage varies. Peak usage times occur mainly at dawn or dusk, so if your machine's malfunction seems to be related to the time of day, this may be a factor. A large load connected to the same line as the game (such as a large air conditioner or other device with an exceptionally large motor) may drop the line voltage significantly when starting up. This drop can result in an intermittent credit problem. In addition, poor connections in the location wiring, plug, or line cord may also cause a significant drop in power. Cold solder joints in the game's harness, especially in areas like the transformer connections, interlock switch, or fuse block, may also produce the same results, although probably on a more permanent basis.

Sometimes location owners (especially in bars) replace light switches with dimmer rheostats, and the game is sometimes on the same line. Obviously, the voltage available to the game is going to drop dramatically when the dimmer is turned.

In any case, the way to check for correct line voltage is with your VOM. Set the VOM to 250 VAC and stick the probes in the wall receptacle. If it's OK here, check the transformer primary connections. If you do not get 117 VAC, examine the solder joints on the transformer, fuse block, and interlock switch. If you do get 117 VAC, the problem must be either in the transformer, harness connections, or in the PCB power supply.

If you suspect the transformer, check its secondaries with the VOM set to 50 VAC and correlate the readings with the legend on the side of the transformer. The transformer must also be correctly grounded, so check the ground potential as well, especially if there is a hum bar rolling up or down the TV screen.

HARNESS PROBLEMS

Other harness problems include blowing fuses and malfunctioning controls. The repeating blown-fuse problem can sometimes be quite exasperating to solve, for short circuits have the tendency to occur in areas almost impossible to find. First, try inserting a new fuse, as old fuses age and blow without cause. If the new one also blows, you definitely have a short.

The best way to approach this problem is by turning the power off and disconnecting devices that may be causing the problem, such as the TV, transformer, and PCB. Disconnect the devices by pulling off their connectors, but do not allow them to touch. If necessary, insulate them with small pieces of electrical tape. Then, connect your VOM across the terminals of the fuse block (all electrical power shut off), and set it to one of the resistance scales. This will save blowing a fuse each time you want to check the circuit.

If the VOM reveals that disconnecting the devices removed the short, reconnect the devices one by one until the short returns. The last device connected is the one that is at fault. If the VOM reads a short even after the devices are disconnected, the fault must lie in the harness itself, and only patient exploration will reveal its location. First, carefully examine all the wiring, looking for terminals that may be touching, metal objects such as coins shorting connections or burned insulation. If necessary, use the VOM to check each suspected wire.

MALFUNCTIONING CONTROLS

One of the most common problems here is a bad potentiometer. Typically, a bad pot will cause the image to jump as it reaches a certain point. The only cure for this one is to install a new pot.

If a feature that is operated by a switch (for example, joysticks, foot pedals, control panel buttons) does not operate at all, check the switch with a VOM or continuity tester to verify its operation. If the switch does not check out, replace it. If the switch is OK, you should suspect the input to the switch from the PCB. In this case, get out the harness and logic schematics and check to see what kind of input it is. In many cases, the input will be +5 VDC. If so, use the VOM to check its presence. Normally, the switch is used to pull a +5 VDC line LOW to GND or to pull a LOW line HIGH. If the PCB output is missing, check the wire length from the PCB. If you find the signal at the PCB trace, the wire length or connection is at fault. If not, begin exploring the PCB using the logic schematics.

A Glossary of Microprocessor Terms

MICROPROCESSOR — one or several microcircuits that perform the function of a computer's CPU. Sections of the circuit have arithmetic and comparative functions that perform computations and executive instructions.

CPU — central-processing unit. A computing system's "brain", whose arithmetic, control and logic elements direct functions and perform computations. The microprocessor section of a microcomputer is on one chip or several chips.

PROM — programmable read-only memory. User permanently sets binary on-off bits in each cell by selectively fusing or not fusing electrical links. Nonerasable. Used for low-volume applications.

EPROM — erasable, programmable, read-only memory. Can be erased by ultraviolet light bath, then reprogrammed. Frequently used during design and development to get programs debugged, then replaced by ROM for mass production.

ROM — read-only memory. The program, or binary on-off bit pattern, is set into ROM during manufacture, usually as part of the last metal layer put onto the chip. Nonerasable. Typical ROM's contain up to 16,000 bits of data to serve as the microprocessor's basic instructions.

RAM — random-access memory. Stores binary bits as electrical charges in transistor memory cells. Can be read or modified through the CPU. Stores input instructions and results. Erased when power is turned off.

LSI — large scale integration. Formation of hundreds or thousands of so-called gate circuits on semiconductor chips. Very large scale integration (VLS) involves microcircuits with the greatest component density.

MOS — metal-oxide semiconductor. A layered construction technique for integrated circuits that achieves high component densities. Variations in MOS chip structures create circuits with speed and low-power requirements, or other advantages (static will damage a MOS chip).

Introduction to the Z-80 CPU

The term "microcomputer" has been used to describe virtually every type of small computing device designed within the last few years. This term has been applied to everything from simple "microprogrammed" controllers constructed out of TTL MSI up to low end minicomputers with a portion of the CPU constructed out of TTL LSI "bit slices." However, the major impact of the LSI technology within the last few years has been with MOS LSI. With this technology, it is possible to fabricate complete and very powerful computer systems with only a few MOS LSI components.

The Zilog Z-80 family of components can be configured with any type of standard semiconductor memory to generate computer systems with an extremely wide range of capabilities. For example, as few as two LSI circuits and three standard TTL MSI packages can be combined to form a simple controller. With additional memory and I/O devices a computer can be constructed with capabilities that only a minicomputer could previously deliver.

New products using the MOS LSI microcomputer are being developed at an extraordinary rate. The Zilog Z-80 component set has been designed to fit into this market through the following factors:

1. ·The Z-80 is fully software compatible with the popular 8080A CPU.
2. Existing designs can be easily converted to include the Z-80.
3. The Z-80 component set is at present superior in both software and hardware capabilities to any other microcomputer system on the market today.
4. For increased throughput the Z80A operating at a 4 MHZ clock rate offers the user significant speed advantages.

Microcomputer systems are extremely simple to construct using Z-80 components. Any such system consists of three parts:

1. **CPU (Central Processing Unit)**
2. **Memory**
3. **Interface Circuits to peripheral devices**

The CPU is the heart of the system. Its function is to obtain instructions from the memory and perform the desired operations. The memory is used to contain instructions and in most cases data that is to be processed. For example, a typical instruction sequence may be to read data from a specific peripheral device, store it in a location in memory, check the parity and write it out to another peripheral device. Note that the Zilog component set includes the CPU and various general purpose I/O device controllers, while a wide range of memory devices may be used from any source. Thus, all required components can be connected together in a very simple manner with virtually no other external logic.

General Purpose Registers

There are two matched sets of general purpose registers, each set containing six 8-bit registers that may be used individually as 8-bit registers or as 16-bit register pairs by the programmer. One set is called BC, DE and HL while the complementary set is called BC', DE' and HL'. At any one time the programmer can select either set of registers to work with through a single exchange command for the entire set. In systems where fast interrupt response is required, one set of general purpose registers and an accumulator/flag register may be reserved for handling this very fast routine. Only a simple exchange command need be executed to go between the routines. This greatly reduces interrupt service time by eliminating the requirement for saving and retrieving register contents in the external stack during interrupt or subroutine processing. These general purpose registers are used for a wide range of applications by the programmer. They also simplify programming, especially in ROM based systems where little external read/write memory is available.

Arithmetic & Logic Unit (ALU)

The 8-bit arithmetic and logical instructions of the CPU are executed in the ALU. Internally the ALU communicates with the registers and the external data bus on the internal data bus. The type of functions performed by the ALU include:

Add	Left or right shifts or rotates (arithmetic and logical)
Subtract	Increment
Logical AND	Decrement
Logical OR	Set bit
Logical Exlusive OR	Reset bit
Compare	Test bit

Instruction Register and CPU Control

As each instruction is fetched from memory, it is placed in the instruction register and decoded. The control sections performs this function and then generates and supplies all of the control signals necessary to read or write data from or to the registers, control the ALU and provide all required external control signals.

Z-80 CPU Pin Description

The Z-80 CPU is packaged in an industry standard 40 pin Dual In-Line Package. The I/O pins are shown in the below figure and the function of each is described.

Z-80 PIN CONFIGURATION
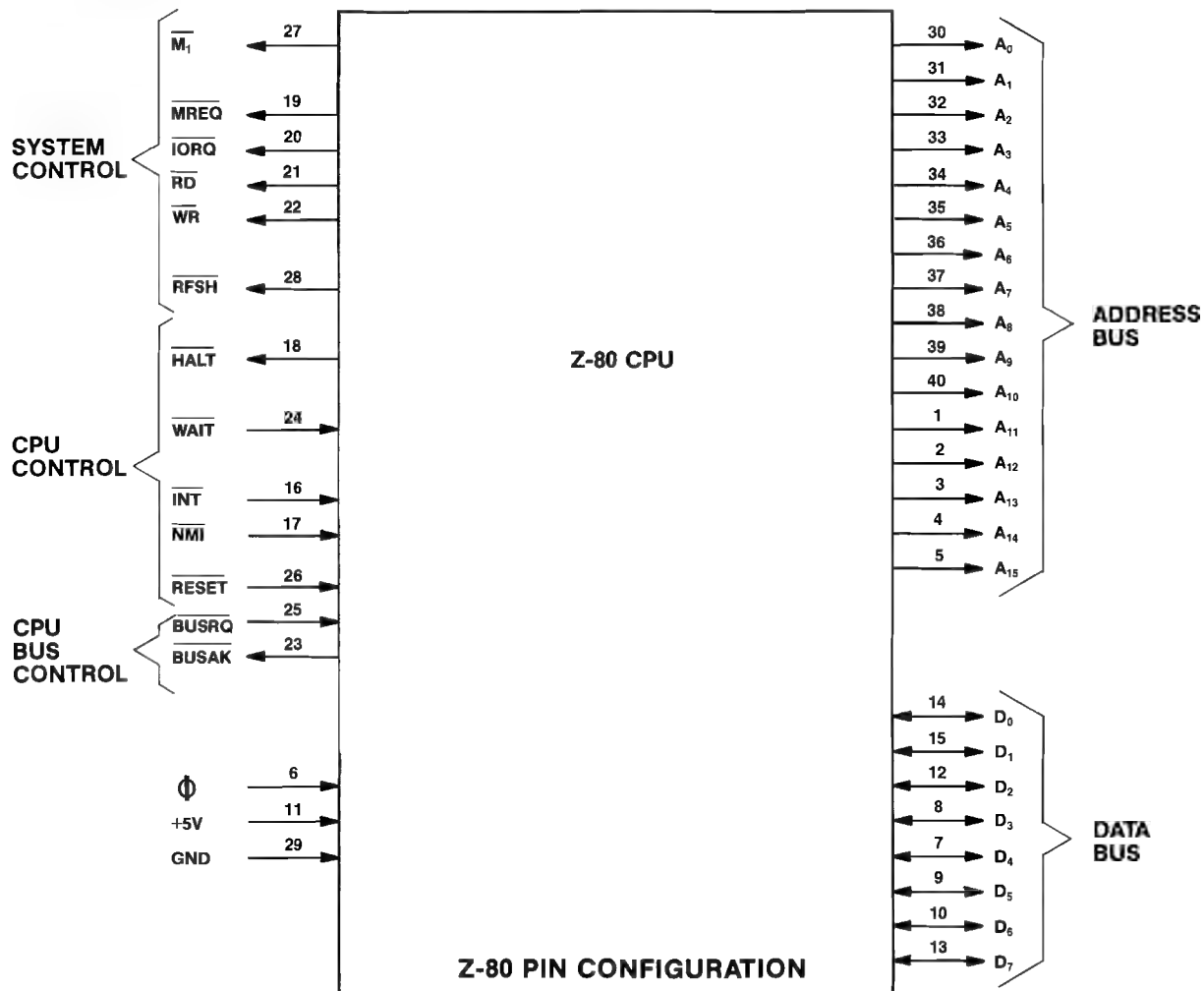
A_0-A_{15}
(Address Bus)
Tri-state output, active high. A_0-A_{15} constitute a 16-bit address bus. The address bus provides the address for memory (up to 64K bytes) data exchanges and for I/O device data exchanges. I/O addressing uses the 8 lower address bits to allow the user to directly select up to 256 input or 256 output ports. A_0 is the least significant address bit. During refresh time, the lower 7 bits contain a valid refresh address.

D_0-D_7
(Data Bus)
Tri-state input/output, active high. D_0-D_7 constitute an 8-bit bidirectional data bus. The data bus is used for data exchanges with memory and I/O devices.

M_1
(Machine Cycle one)
Output, active low. $\overline{M_1}$ indicates that the current machine cycle is the OP code fetch cycle of an instruction execution. Note that during execution of 2-byte op-codes, $\overline{M1}$ is generated as each op code byte is fetched. These two byte op-codes always begin with CBH, DDH, EDH or FDH. $\overline{M1}$ also occurs with $\overline{IORQ}$ to indicate an interrupt acknowledge cycle.

MREQ
(Memory Request)
Tri-state output, active low. The memory request signal indicates that the address bus holds a valid address for a memory read or memory write operation.

IORQ
(Input/Output Request)
Tri-state output, active low. The $\overline{IORQ}$ signal indicates that the lower half of the address bus holds a valid I/O address for a I/O read or write operation. An $\overline{IORQ}$ signal is also generated with an $\overline{M1}$ signal when an interrupt is being acknowledged to indicate that an interrupt response vector can be placed on the data bus. Interrupt Acknowledge operations occur during M_1 time while I/O operations never occur during M_1 time.

RD
(Memory Read)
Tri-state output, active low. $\overline{RD}$ indicates that the CPU wants to read data from memory or an I/O device. The addressed I/O device or memory should use this signal to gate data onto the CPU data bus.

WR
(Memory Write)
Tri-state output, active low. $\overline{WR}$ indicates that the CPU data bus holds valid data to be stored in the addressed memory or I/O device.

RFSH
(Refresh)
Output, active low. $\overline{RFSH}$ indicates that the lower 7 bits of the address bus contain a refresh address for dynamic memories and the current MREQ signal should be used to do a refresh read to all dynamic memories.

HALT
(Halt state)
Output, active low. $\overline{HALT}$ indicates that the CPU has executed a HALT software instruction and is awaiting either a non maskable or a maskable interrupt (with the mask enabled) before operation can resume. While halted, the CPU executes NOP's to maintain memory refresh activity.

WAIT
(Wait)
Input, active low. $\overline{WAIT}$ indicates to the Z-80 CPU that the addressed memory or I/O devices are not ready for a data transfer. The CPU continues to enter wait states for as long as this signal is active. This signal allows memory or I/O devices of any speed to be synchronized to the CPU.

INT
(Interrupt Request)
Input, active low. The Interrupt Request signal is generated by I/O devices. A request will be honored at the end of the current instruction if the internal software controlled interrupt enable flip-flop (IFF) is enabled and if the $\overline{BUSRQ}$ signal is not active. When the CPU accepts the interrupt, an acknowledge signal ($\overline{IORQ}$ during M_1 time) is sent out at the beginning of the next instruction cycle. The CPU can respond to an interrupt in three different modes that are described in detail in section 5.4 (CPU Control Instructions).

NMI
(Non-Maskable Interrupt)
Input, negative edge triggered. The non maskable interrupt request line has a higher priority than $\overline{INT}$ and is always recognized at the end of the current instruction, independent of the status of the interrupt enable flip-flop. $\overline{NMI}$ automatically forces the Z-80 CPU to restart to location 0066H. The program counter is automatically saved in the external stack so that the user can return to the program that was interrupted. Note that continuous $\overline{WAIT}$ cycles can prevent the current instruction from ending, and that a $\overline{BUSRQ}$ will override a $\overline{NMI}$.

RESET
Input, active low. RESET forces the program counter to zero and initializes the CPU. The CPU initialization includes:

1) Disable the interrupt enable flip-flop

2) Set Register I = 00$_H$

3) Set Register R = 00$_H$

4) Set Interrupt Mode 0

During reset time, the address bus and data bus go to a high impedance state and all control ouput signals go to the inactive state.

BUSRQ
(Bus Request)

Input, active low. The bus request signal is used to request the CPU address bus, data bus and tri-state output control signals to go to a high impedance state so that other devices can control these buses. When BUSRQ is activated, the CPU will set these

buses to a high impedance state as soon as the current CPU machine cycle is terminated.

BUSAK
(Bus Acknowledge)

Output, active low. Bus acknowledge is used to indicate to the requesting device that the CPU address bus, data bus and tri-state control bus signals have been set to their high impedance state and the external device can now control these signals.

CLK
(Clock)

Single phase TTL level clock which requires only a 330 ohm pull-up resistor to +5 volts to meet all clock requirements.

PLEASE NOTE:

THE INFORMATION CONTAINED IN THIS SECTION
IS TOLD IN AN EASY TO UNDERSTAND MANNER
AND IS INTENDED TO AID THOSE WITHOUT AN
ELECTRONICS DEGREE IN TROUBLESHOOTING AND
REPAIRING THEIR GAMES T.V. MONITOR.

IF YOU READ THROUGH THIS SECTION AND STILL
HAVE QUESTIONS, PLEASE CONTACT YOUR DISTRIBUTOR
OR MIDWAY MANUFACTURING COMPANY AT THE TOLL
FREE NUMBER PROVIDED WITH YOUR GAMES PAPERS.

**OUR STAFF AND OUR DISTRIBUTORS STAND READY
TO HELP YOU!**

THANK YOU

VI   T.V. Monitor

Color T.V. Monitor

Introduction: (How to use this section of your manual.)

This section has been designed to simply familiarize you with one of the more mystical components in your game — the T.V. monitor. If you are an electronics technician who is quite knowledgeable on the subject, you may decide to just go to the schematics and start troubleshooting the defective monitor. But if you are like most people, a monitor is a T.V. set, and that means a complex doo-dad that means big buck repairs. This isn't necessarily so. This section of the manual will acquaint you with the monitor and could just help you repair it if you feel adventurous enough to give it a try. If you have any knowledge of electronics, especially the use of a voltmeter, the repairs you can make are astonishing. Just keep in mind that **ELECTRICITY CAN BE VERY DANGEROUS, SO BE CAREFUL!!**

If you want to understand how a monitor works, just read the "THEORY OF OPERATION" subsection. If you wish, you can follow along with the schematics. The information is presented in a very basic manner but more complete treatment of the subject can be found in the technical sections of bookstores.

If you want to attempt to repair your monitor, it would be a good idea to read this whole section beginning to end before starting. **Pay attention to all warnings**

and take them seriously. The more equipment you have the better, but a low cost Volt-Ohm-Milliameter can often do the trick. Here are the steps to take:

1. Find the symptom that matches the problems your monitor has in the "SYSTEM — DIAGNOSIS" subsection. The diagnosis tells the circuit or area the problem may be in and possibly even the actual component causing it.
2. Once you have the circuit that is causing the trouble, read the "TROUBLESHOOTING" subsection to learn the procedure for finding the bad part.
3. Next, go to the schematic section and find the schematic that matches your monitor. It may be helpful to read the "DIFFERENCES BETWEEN MONITORS" subsection if you are unsure of which monitor you have. Use the schematic to see what parts are in the offending circuit.

That really is all there is to it. Just remember that there are some bizarre or rare symptoms not covered, or that a monitor may have two or more different problems that only a genius, the experienced, or an experienced genius can figure out. But be patient, follow safety precautions, and remember that there is also literature available from the monitor companies through your distributor or from Midway Manufacturing Company on request. (There is a toll free number on the back side of the front cover of this manual.)

Symptom Diagnosis

1. **Insufficient width or heighth:**
   A. Horizontal line (due to VERTICAL CIR-CUIT DEFECT).
      - Bad yoke.
      - Bad vertical output section.
      - Open fusible resistor in vertical section.
      - Bad height control.
      - Bad flyback.
   B. Vertical line (due to HORIZONTAL CIR-CUIT DEFECT).
      - Bad yoke.
      - Open width coil.
      - Open part in horizontal output section.

2. **Picture spread out too far or crushed in certain areas:**
   A. Horizontal or vertical output transistor.
   B. Bad component in output circuitry.

3. **Line too close with black spacing:**
   A. Problem in vertical section causing poor linearity.

4. **Poor focus and convergence:**
   A. Bad high voltage transformer ("flyback") or control.
   B. Focus voltage wire not connected to neck-board terminal.

5. **Colors missing; check:**
   A. Interface color transistors.
   B. Color output transistors.
   C. Cracked printed circuit board.
   D. Color circuits.
   E. Video input jack.

6. **Picture not bright enough:**
   A. Weak emission from picture tube. (Turn horizontal sync off frequency and put brightness all the way up for about 15 minutes. Occasionally this cures the problem.)

7. **Silvery effect in white areas; check:**
   A. Beam current transistors.
   B. Weak picture tube emission.

8. **Too much brightness with retrace lines; check:**
   A. Beam limiter transistors.
   B. Brightness and/or color blanking control set too high.

9. **Increasing brightness causes an increase in size and poor focus.**
   A. Weak high voltage rectifier or regulation (high voltage unit).

10. **Small picture and/or poor focus:**
    A. Low B+ voltage (power supply trouble).

11. **Vertical rolling:**
    A. Vertical oscillator transistor, IC, or circuit.
    B. No sync from logic board.

12. **Horizontal line across center:**
    A. Vertical output circuit is dead (see symptom No. 1. A.).
    B. Vertical oscillator is not putting out the right wave form.

13. **Picture bends:**
    A. Horizontal sync needs adjusting.
    B. Magnetic or electromagnetic interference.

14. **Flashing picture, visable retrace lines:**
    A. Broken neck board.
    B. Internal short circuit in the picture tube (arcing).

15. **Unsymmetrical picture or sides of picture:**
    A. Defective yoke.

16. **No brightness, power supply operating — No high voltage for the picture tube; check:**
    A. Horizontal oscillator.
    B. Horizontal amplifier and output.
    C. Flyback transformer (high voltage unit).

17. **No brightness, high voltage present; check:**
    A. Heater voltage to the tube at the neck board.
    B. Screen-grid voltage for the tube.
    C. Focus voltage.
    D. Grid to cathode picture tube bias.

18. **No high voltage; check:**
    A. For AC input to the "flyback".
    B. Horizontal deflection stages.
    C. Flyback transformer.
    D. Yoke.
    E. Power supply.

19. **No horizontal and vertical hold; check:**
    A. Sync transistors and circuit.
    B. Wires and jack from logic board to the monitor.

20. **Wavey picture — (power supply defect); check:**
    A. Transistors, diodes, electrolytic capacitors in the power supply.

21. **Moving bars in picture:**
    A. Ground connector off between monitor and logic boards.
    B. Defect in the power supply (see wavy picture symptom).

22. **Washed out picture (see picture not bright enough):**
    A. Check video signal at the cathode pins with an oscilloscope. If there is about 80 volts peak to peak, the picture tube has weak emission.

23. **Monitor won't turn on:**
    A. Problem in the power supply: Check fuse, transistors, open fusible resistor.
    B. Shorted horizontal output transistor.

C. Defective high voltage disabling circuit.
D. Crack(s) somewhere on main chassis board.

24. **Can't adjust purity or convergence:**
    A. Use a degausser to demagnetize the picture tube carefully following your degausser's instructions.
    B. Picture tube defective.
    C. Metal foreign material is in picture tube shield.
    D. Nearby equipment is electromagnetically interferring.
    E. The poles of the earth are pulling off the purity.
    F. Poor focus or width of picture.

Guide To Schematic Symbols
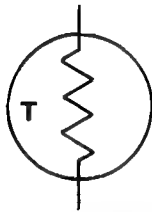
THERMISTOR
(POLARITY DOESN'T MATTER)
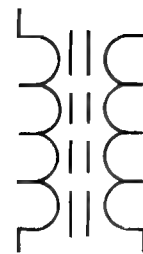
IRON CORE TRANSFORMER
(SUCH AS A FLYBACK)

INDUCTOR, COIL, CHOKE
(POLARITY DOESN'T MATTER)

FUSE
(POLARITY DOESN'T MATTER)

(-) CATHODE

(+) ANODE

ZENER DIODE

CATHODE (-)

ANODE (+)

DIODE

COLLECTOR
BASE
EMITTER
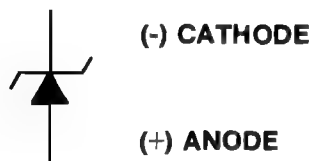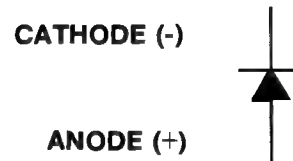
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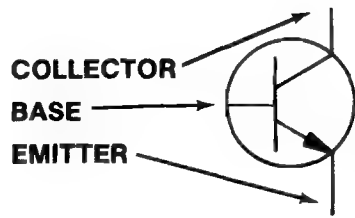
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EMITTER
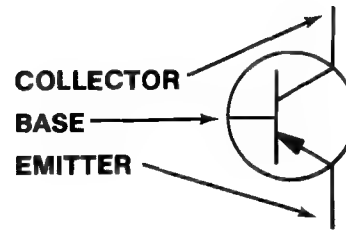
PNP TRANSISTOR

VARIABLE RESISTOR, POT, CONTROL
(POLARITY DOESN'T MATTER)

RESISTOR
(POLARITY DOESN'T MATTER)
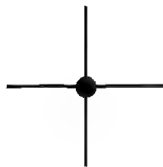
LINES ARE CONNECTED

+

ELECTROLYTIC CAPACITOR
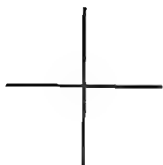
LINES ARE NOT CONNECTED

CAPACITOR
(POLARITY DOESN'T MATTER)

OR

GROUND

Troubleshooting

Troubleshooting monitors requires experience, patience, **and luck**. The first step is to match the symptom the monitor displays to the diagnosis next to it in the "SYMPTOM-DIAGNOSIS" subsection. This will pinpoint the circuit the problem is probably in, and often the parts to check. Next, the circuit should be visually inspected to see if there are any parts broken, burned, or if something is there that shouldn't be, like a loose screw, etc. Some parts go bad before others and should be checked first. In fact, following is the general order in which parts usually go bad:

1. Semiconductors (like transistors, diodes, and integrated circuits).
2. Fusible resistors.
3. Electrolytic capacitors.
4. Resistors.
5. Capacitors and coils.

Always remember that a monitor can bite like a snake. Even when it is turned off, capacitors hold voltage and will discharge it to you should you be touching chassis ground. The picture tube or CRT, itself, is a giant capacitor, so avoid the flyback anode plug hole. With the monitor on, the power supply circuit and/or the flyback, which puts out at least 18,000 volts, **CAN BE KILLERS!!** Avoid handling power transistors (usually output transistors), yoke terminals, and other high power components when the monitor is on.

WARNING: That picture tube is a bomb! When it breaks, first it implodes, then it explodes. Large pieces of glass have been known to fly in excess of 20 feet in all directions. **DO NOT** carry it by the long, thin neck. Discharge its voltage to ground by shorting the anode hole to ground. Use a plastic handled screwdriver, connect one end of a wire with an alligator clip at each end to chassis ground and the other end to the metal shaft of the screwdriver. Using ONE HAND ONLY (put the other in your pocket) and touching ONLY the plastic handle of the screwdriver **(DO NOT TOUCH THE METAL SHAFT)** stick the blade of the screwdriver into the anode hole. Be prepared for a fairly loud pop and a flash. The longer the monitor has been turned off, the smaller the pop and dimmer the flash. But **BE CAREFUL**, picture tubes will hold a very healthy charge for at least **a week** if not longer. Even after you've discharged it once, it may still carry a residual charge. It's better to be too careful than dead, which is why electronic equipment always carries stickers referring servicing to qualified personnel. Handle the side with the viewing screen against your chest when changing it. **ALWAYS** wear safety goggles when handling the picture tube.

To maintain the safety and performance of the monitor, always use exact replacement parts. For instance, the wrong components in the power supply can cause a fire, or the wrong color transistor may give a funny color to the picture. Service your monitor on a nonconductive firm table like wood, **NOT METAL,** and take off all of your jewelry just in case. With all this in mind, you are ready to begin troubleshooting.

Observe the picture carefully. Try to vary the appropriate control that would most likely affect your particular symptom. For example, if there is poor brightness or no picture, try turning up the brightness or contrast control. If the controls have no effect at all, chances are there is trouble with the control itself, the circuit it controls, or a nearby circuit that may be upsetting voltages. Go to the list of symptoms and determine with the schematic where the bad circuit is.

CAUTION:

Keep in mind that capacitors hold a charge as can the picture tube (for at least a week and usually longer), and could shock you.

First, check for obvious visual defects such as broken or frayed wires, solder where it is not supposed to be, missing components, burned components, or cracked printed circuit boards. If everything looks good up to this point, make sure that diodes, electrolytic capacitors, and transistors have their leads connected in the right polarity as shown on the schematic and the circuit board.

Turn on the power and measure the voltages at the leads of the active devices such as tubes, transistors, or integrated circuits. Any voltage that does not come within at least 10% to 15% of the voltage specified on the schematic indicates either a problem with that device or a component connected with it in the circuit. The next step is to use the ohmmeter to narrow down the field of possible offenders.

To test a transistor, one lead of the ohmmeter is placed on the base; and the other lead placed just on the emitter, then on the collector. A normal transistor will read either high resistance (infinite), or little resistance (400 to 900 ohms), depending on the polarity of this type transistor. Then the leads should be switched, one remaining on the base, and the other switched from the emitter to the collector. Now the opposite condition should result: the resistance should be infinite if it was lower when the other lead was on the base. Consistantly infinite readings indicate an open, and a short is demonstrated by 0-30 ohms on most of these test readings. Finally, place one lead on the collector, then the other on the emitter. No matter which lead is used, there should be infinite resistance. Any lower reading, such as 50 ohms (which is typical on a bad transistor), indicates a short.

This all sounds pretty confusing, but a little experience on a good transistor will make you an expert in no time. Usually, the lowest ohmmeter setting is used for testing transistors. Once in a great while a transistor may check out good on this test, but may actually be "leaky" or break down only on higher voltages. If in doubt, change it. It is also wise to check the transistor out of the circuit just in case some component in the circuit is affecting the ohmmeter reading.

A diode is tested like a transistor except it only has two leads. Again, there should be high resistance one way and little resistance the other. If it tests bad, take one lead out of the circuit in case some component is messing up the ohmmeter reading.

NOTE: **DO NOT** leave soldering equipment on the leads too long since all semiconductors, especially integrated circuits, are easily destroyed by heat.

Without special equipment, integrated circuits are checked by verifying the proper DC voltage on the pins and the correct AC wave form using an oscilliscope. **BE CAREFUL:** Shorting their pins can easily destroy them.

Resistors are checked with an ohmeter and should usually be within ten percent of the value stated on them and on the schematic. You may have to desolder one lead from the printed circuit board. If you wreck the foil on the board, carefully solder a small wire over the break to reconnect the conductive foil.

Capacitors are tricky. Their resistance goes up when checked with an ohmmeter which shows a charging action. As they suck up current from the meter, the voltage goes up and so does the resistance. If you are sure a particular circuit is giving you a problem and everything else checks out O.K., Electrolytic capacitors are prime suspects. Substitute a new one and keep your fingers crossed.

Theory of Operation

To understand what goes on inside the monitor, large general groups of circuits will be examined instead of laboriously analyzing the branches and small circuits that make up these groups. This will help avoid confusion and aid in a basic, concrete, knowledge of what makes up a monitor.

THE POWER SUPPLY —

The AC going to the monitor from the game transformer is just like the voltage and current from your wall outlet. It jumps up and down going positive and negative sixty times a second. But a monitor needs nice, smooth DC; direct current, not alternating. So diodes chop up the AC and a big electrolytic capacitor filters it out to make it even smoother. Since the monitor is a big piece of electronic equipment, with many circuits demanding a lot of power from the power supply, there are also zener diodes and transistors to help maintain a nice, constant, smooth voltage so that the monitor circuits don't jump around. And this is what happens when you see a wavy picture. There is AC creeping through the power supply, so it must be malfunctioning. If the voltage from the power supply is too low, the other circuits will be starved for power and you may see a small, wavy picture, or none at all.

Some circuits receive voltages that are higher than what the power supply should put out. But they come from the flyback transformer which will be discussed later.

THE INTERFACE SECTION OF THE CHASSIS —

The interface section of the chassis is fairly easy to identify. It is right by the place where the video jack(s) from the logic board(s) plug into. There are sets of transistors that receive the separate red, green, blue, and sync information from the cables that come from the logic boards. The circuits jack up the voltage and match impedances, or in other words, prepare the logic board outputs for the circuits that will really amplify them for the output devices such as the yoke in the case of the sync, or the picture tube that shows the colors.

An interesting aside is that our sync is composite negative sync. That means two things:

1. The sync is a negative going wave form.
2. There are two pulses going at different speeds over the same wire:
   a. Vertical wave forms at 60 times per second (or Hertz) and
   b. Horizontal wave forms at about 15,750 times per second (Hz).

The sync is amplified by a sync amplifier transistor and sent on its way to the oscillators. The sync or timing information will be explained along with the oscillator shortly.

The color information is sent via wires to the neck board where the main amplification occurs. This will also be discussed later.

VERTICAL AND HORIZONTAL DEFLECTION —

After the sync signal is amplified by the sync amp, it goes to two different sections, the vertical and horizontal circuits. Basically, the sync signals are for timing so the picture doesn't mess up since it is assmebled like an orderly jigsaw puzzle, but so fast that you can't see the electron beams for each color painting the picture on the screen. This will all become clear soon. For now, we will follow the 60 cycle component of the sync as it goes on its journey to the deflection yoke.

The 60 cycle pulse goes to the vertical oscillator to make sure this circuit goes back and forth (or oscillates) at 60 times a second. Without this pulse keeping the circuit at the correct speed, it may get lazy and oscillate at 58 cycles or lower, or get ambitious and oscillate at 62 cycles or higher. At the wrong speed, the picture will start to roll up or down.

A Wells Gardner 13" or 19" color monitor uses transistors for its sync section. An Electrohome 13" or 19" color monitor uses an integrated circuit IC501 for its sync section. The idea is all the same. The output to the vertical amplifying transistors for all monitors must be a sawtooth wave form, sort of like a bunch of pyramids, racing to the yoke's vertical coils at 60 times a second.

Along the way to the output transistors, the 60 cycle pulse is shaped and amplified to do the job: the yoke magnetically pushes the electron beam to fill the screen out sideways looking at the screen with the greatest length going up and down. Or viewing the screen sitting like a home television set. The amplified vertical output fills the screen up and down. Watching a monitor like this, seeing only a horizontal line means a problem with the vertical coils of the yoke or anything from the vertical output section on back to the oscillator.

The horizontal section is very similar with a few exceptions. The horizontal wave shape is more like a square and has a frequency of 15,750 cycles a second. Again, Wells Gardner uses transistors for the horizontal oscillator, and Electrohome uses the other side of IC501. Still, the effect is the same. If the oscillator isn't going at the correct speed, the picture may move sideways, start to slant, or tear up with slanted thin figures. With both the vertical and horizontal of all monitors, there are variable resistors that change the speed of the oscillators up and down. This way you have controls that can make the correct frequencies to keep the electronic jigsaw puzzle nicely locked in place. If you're driving in a car and next to you someone else is driving their car at exactly the same speed, it will appear that they are not moving. And this is why the sync frequency and the oscillators frequencies must match, so the picture doesn't appear to move.

The correct wave form is shaped and amplified in the circuitry just like in the vertical section. But the horizontal output transistor is a large power transistor and not only serves to give current to the horizontal yoke windings, it also feeds the flyback transformer.

THE FLYBACK TRANSFORMER (OR HIGH VOLTAGE UNIT) —

The picture tube needs high voltage to light up, and the power supply can't meet this demand. The flyback transformer receives current alternating at about 15,750 times per second from the horizontal output transistor. The "flyback" jacks up its input voltage and puts out a higher voltage alternating at the same speed. But, in your "flyback" there are diodes that chop up the alternating voltage to make it a smooth DC output just like in the power supply. This is what goes through that thick red wire to your picture tube. THIS AREA HAS ABOUT 18,000 VOLTS ON IT **AND IT CAN KILL YOU!!**

The "flyback" may be dangerous, but it is also generous. It has extra output windings which give voltage to the heater pins of the picture tube, voltage for the vertical deflection circuits, and picture tube screen-grid voltage. So in a way, the high voltage "flyback" is like a second power supply.

COLOR CIRCUITS

The color circuits are pretty straight forward. The signals go into the interface section where some amplification and impedance matching occurs. These circuits are pretty sparse and simple. Each color just has two transistors and a diode with some resistors and capacitors. From here, the AC color signal is sent by wires to the neck board.

The color output circuits are on the neck board. The color signals going to the transistors are controlled by two variable resistors called drive controls. There only two, one for the red and one for the green. The

blue doesn't have one. In the emitter part of each transistor is another variable resistor that is the cut off control. These controls vary the amount of amplified AC signal that goes to the cathodes of the picture tube. The more signal, the more color. The bases of each of these transistors are connected together and are all connected to the blanking and beam limiting transistors which are in the interface section.

The beam limiter helps control the brightness level, and the blanking transistor rapidly turns the picture tube on and off so that retrace lines don't show up on the screen. By turning up the brightness on a good monitor, these four to six retrace lines can be seen slanting diagonally across the picture.

PROTECTION CIRCUIT —

To protect the high voltage section against voltages that are too high coming from the power supply which could cause X-rays to be emitted from the "flyback", a circuit senses the higher power supply voltage, and using a transistor, turns off the horizontal oscillator. Since the horizontal oscillator doesn't work, the horizontal output transistor has nothing to feed the "flyback" which in turn has nothing to feed the picture tube. The monitor will be silent, have no picture, and will appear to be off. **But don't be fooled.** There is still that excessive amount of voltage coming from the power supply. To find out, check the emitter on TR502 of the Wells Gardner monitors; or the emitter of X04 for the Electrohome monitor. Here are the voltages you should receive:

Wells Gardner = 127VDC
Electrohome = 120VDC

The best place to measure this voltage on an Electrohome monitor is at a pin marked B1 on the chassis. This is because a 13 inch color Electrohome monitor, the G07-FB0 or G07-902, has an integrated circuit and very little else in the power supply. Still, there should be 120VDC at B1.

THE PICTURE TUBE (OR CRT) —

The picture tube or CRT is an output device. In other words, the end result of the circuits work is displayed by this part. Actually, the output of other circuits is in the neck of the picture tube.

First, there is the heater. The heater boils off electrons from the cathodes so that they (the electrons) shoot up to the screen to excite the phosphors so that the three phosphors emit three colors of light.

The cathodes are next, and again they emit electrons to turn on the tube phosphors, making it glow. The cathode can arc or short to the heater resulting in no picture and a defective picture tube.

Next come the grids. The first grid is grounded. The following grid is the screen grid which receives about 300VDC depending on the brightness setting. The next grid closest to the picture tube screen is the focus grid which gets about one fifth the amount of voltage that is applied to the picture tube anode.

After jetting from the cathode through all these grids, the electrons speed through a mask, a sheet of material with tiny holes, and then excite the tiny dots of phosphor in the inside surface of the picture tube screen. The green electron gun (or cathode and circuitry) spits out electrons which head for the green phosphors only. The same goes for the red and blue guns. The way the phosphor light blends determines the color seen. Should these electron beams become too intense, they may burn the phosphor. With the monitor off, this can be seen as a dark permanent image of the video information on the tube screen.

Differences Between Monitors

The easiest way to identify the brand of monitor you are working with, assuming you can't find the brand name written on it anywhere, is to see if there are two circuit boards rising up from the chassis toward the picture tube neck. In other words, they stand up, or are perpendicular to the chassis, with a black plastic bracket holding them in place. This is a description of a Wells Gardner monitor. They use separate boards for main chunks of circuitry. Therefore, you have a "power board" (the power supply), an "interface board" (the interface section), and a "horizontal/vertical board" (for the deflection circuitry). Still, there are a few parts on the chassis, but most can be found on the board. An Electrohome monitor has no separate boards, except for the neck board, and just has a flat chassis.

Another good way to determine which monitor you have is to check the transistor call out numbers that are printed on the chassis next to the part. For instance, on the neck board, one of the color output transistors is TR401. If you look through the schematics or the parts lists, you will find TR401 in the Wells Gardner literature. On the other hand, the neck board transistor may say X101. X101 can be found in the Electrohome literature. So, all Wells Gardner transistor call outs begin with TR, and Electrohome transistor call outs start with an "X".

Parts Interchangeability

Some parts can be interchanged on all of the monitors. Here are the rules:

1. You **CAN** swap the voltage regulator TR502 or X01 on any Wells Gardner or Electrohome 19 inch monitor. You **CAN NOT** swap the voltage regulator on the 13 inch Wells Gardner or Electrohome (G07-902) since the Electrohome uses an integrated circuit for the power supply.

2. You **CAN** swap any resistor between monitors that has the same resistance, wattage rating, and tolerance.

3. You **CAN** swap any capacitor between monitors that has the same capacitance, and voltage rating.

4. **PICTURE TUBES:**

   Due to the fact that "ELECTROHOME" is now (October, 1981) using a picture tube with an **internal shield,** these picture tubes can be used in EITHER "WELLS GARDNER" or "ELECTRO-HOME" monitors.

However, a "WELLS GARDNER" picture tube can **ONLY** be used in a "WELLS GARDNER" monitor. It will not function properly if installed in an "ELECTROHOME" monitor. The picture purity will be off.

5. You **CAN NOT** change any part that is a **safety part**, one that is shaded in gray on the schematic; it **MUST** be **IDENTICAL** to the original. **To do otherwise IS DANGEROUS.** For instance, the 13 inch Electrohome (G07-904) monitor "flyback". looks identical to the 19 inch Electrohome (G07-904) monitor "flyback".
   In fact, there is even a 19 inch Electrohome (G07-905) monitor (which is an obsolete model) with a similar looking "flyback". **NONE OF THESE ARE INTERCHANGEABLE!!**

6. You **CAN** change any of the parts between the G07-904 and G07-907. They're essentially the same monitor except that the G07-907 has a vertically mounted picture tube.

If there is any doubt about what parts can be swapped between each manufacturer's 19 inch and 13 inch models, compare the manufacturer's part number between each one. If they match up, they are the same part.

WELLS-GARDNER 19" COLOR MONITOR SCHEMATIC DIAGRAM

M051-00087-A012

K4625A, K4626A, K4675A – 5816

6-10

RESISTORS

Ref. No.	Part No.	Description
R301	203X6500-628	820 Ohm, ± 5%, 1/8W Carbon
R302	203X6500-902	12k Ohm, ± 5%, 1/8W Carbon
R303	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon
R304	203X6500-886	10k Ohm, ± 5%, 1/8W Carbon
R305	203X6501-241	330k Ohm, ± 5%, 1/8W Carbon
R306	203X6500-645	1k Ohm, ± 5%, 1/8W Carbon
R307	203X6500-689	1.5k Ohm, ± 5%, 1/8W Carbon
R309	203X6500-724	2.2k Ohm, ± 5%, 1/8W Carbon
R310	203X6501-285	470k Ohm, ± 5%, 1/8W Carbon
R311	203X6501-065	56k Ohm, ± 5%, 1/8W Carbon
R312	203X6501-126	100k Ohm, ± 5%, 1/8W Carbon
R313	203X6001-326	10k Ohm, ± 5%, 1/8W Carbon
R314	203X6501-044	47k Ohm, ± 5%, 1/8W Carbon
R315	203X6500-628	820 Ohm, ± 5%, 1/8W Carbon
R316	203X6500-420	120 Ohm, ± 5%, 1/8W Carbon
R317	203X6206-441	2.2 Ohm, ± 5%, 1/2W Carbon
R319	203X6500-169	100 Ohm, ± 5%, 1/8W Carbon
R320	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon
R321	203X6700-509	560 Ohm, ± 5%, 1/2W Carbon
R322	203X9100-121	22 Ohm, ± 5%, 2W M.O.
R323	203X6500-689	1.5K Ohm, ± 5%, 1/8W Carbon
R324	203X6500-988	27k Ohm, ± 5%, 1/8W Carbon
R325	203X6500-326	47 Ohm, ± 5%, 1/8W Carbon
R328	203X6500-628	820 Ohm, ± 5%, 1/8W Carbon
R330	203X6500-886	10k Ohm, ± 5%, 1/8W Carbon
R331	203X6501-209	220k Ohm, ± 5%, 1/8W Carbon
R351	203X6500-724	2.2k Ohm, ± 5%, 1/8W Carbon
R352	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon
R353	203X6500-944	18k Ohm, ± 5%, 1/8W Carbon
R354	203X6500-783	3.9k Ohm, ± 5%, 1/8W Carbon
R355	203X6500-902	12k Ohm, ± 5%, 1/8W Carbon
R356	203X6500-561	470 Ohm, ± 5%, 1/8W Carbon
R357	203X6500-724	2.2k Ohm, ± 5%, 1/8W Carbon
R358	203X6500-666	1.2k Ohm, ± 5%, 1/8W Carbon
R359	203X6501-088	68k Ohm, ± 5%, 1/8W Carbon
R360	203X5500-471	27 Ohm, ± 5%, 1/4W Comp.
R361	203X6000-998	1.2k Ohm, ± 5%, 1/8W Carbon
R363	203X6500-666	1.2k Ohm, ± 5%, 1/8W Carbon
R364	203X9014-988	47k Ohm, ± 5%, 1W M.O.
R365	203X6700-989	56k Ohm, ± 5%, 1/2W Carbon
R366	203X6001-148	3.3k Ohm, ± 5%, 1/8W Carbon
R367	340X2222-734	2.2k Ohm, ± 5%, 1/2W Carbon
R368	203X6500-785	3.9k Ohm, ± 5%, 1/8W Carbon
R369	203X6500-762	3.3k Ohm, ± 5%, 1/4W Carbon
R370	302X6100-961	1k Ohm, ± 5%, 1/4W Carbon
R371	203X6104-751	2.7k Ohm, ± 5%, 1/4W Carbon
VR301	204X2122-093	Varistor, 250K Ohm, Vert. Hold
VR302	204X2114-065	Varistor, 20K Ohm, Vert. Size
VR351	204X2114-059	Varistor, 50K Ohm, Hor. Hold

CAPACITORS

Ref. No.	Part No.	Description
C301	203X1100-928	0.15 uF, 50V, ± 10% Mylar
C302	203X1100-573	0.022 uF, 50V, ± 10% Mylar
C304	203X1100-858	0.1 uF, 50V, ± 10% Mylar
C306	203X0025-026	2.2 uF, 50V, Electrolytic
C307	203X1100-928	0.15 uF, 50V, ± 10% Mylar
C309	203X1100-858	0.1 uF, 50V, ± 10% Mylar
C310	203X0010-011	22 uF, 16V Electrolytic
C311	203X0020-099	1000 uF, 35V Electrolytic
C312	202X7000-469	0.0082 uF, 50V, ± 10% Ceramic

CAPACITORS (CONT.)

Ref. No.	Part No.	Description
C313	203X0025-087	47 uF, 50V Electrolytic
C315	203X0015-082	10 uF, 25V Electrolytic
C316	203X1100-220	3300 uF, 50V, ± 10% Mylar
C317	202X8000-616	100 pF, 50V, ± 10% Ceramic
C351	202X7000-281	1500 pF, 50V, ± 10% Ceramic
C352	202X7000-247	1000 pF, 50V, ± 10% Ceramic
C353	203X1100-573	0.022 uF, 50V, ± 10% Mylar
C355	203X1100-858	0.1 uF, 50V, ± 10% Mylar
C356	203X0015-105	4.7 uF, 25V Electrolytic
C357	203X1201-013	0.015uF, 200V ± 10% PP
C358	203X1201-034	0.018 uF, 200V, ± 10% PP
C359	203X0040-013	4.7 uF, 160V Electrolytic
C360	202X7000-482	0.01 uF, 50V, ± 10% Ceramic
C361	203X1100-509	0.015 uF, 50V, ± 10% Mylar
C362	203X0025-058	10 uF, 50V Electrolytic
C363	203X1205-487	0.01 uF, 630V, ± 10% PP
C364	202X7000-482	0.01 uF, 50V, ± 10% Ceramic

SEMICONDUCTORS

Ref. No.	Part No.	Description
TR301	200X4082-614	Transistor, 2SA826Q
TR302	200X3174-006	Transistor, 2SC1740Q
TR303	200X3174-006	Transistor, 2SA1740Q
TR304	200X3174-006	Transistor, 2SC1740Q
TR305	200X4049-081	Transistor, 2SA490YLBGLI
TR306	200X3162-538	Transistor, 2SC1625YLBGLI
TR307	200X3174-014	Transistor, 2SC1740R
TR308	200X3174-006	Transistor, 2SC1740Q
TR351	200X4085-415	Transistor, 2SA854Q
TR352	200X3172-208	Transistor, 2SC1722BKS
TR353	200X3174-006	Transistor, 2SC1740Q
TR354	200X4082-614	Transistor, 2SA826Q
X301	201X2010-144	Diode, (SI) IS2473-T72
X302	201X2010-144	Diode, (SI) IS2473-T72
X303	200X8000-026	Diode, (GE), IN60TVGL
X304	200X8010-165	Diode (SI) ISS81
X305	201X2010-165	Diode (SI) ISS81
X306	201X2010-165	Diode (SI) ISS81
X307	200X8010-102	Diode (SI) MA26W
X308	200X8010-094	Diode (SI) IS2473
X351	201X2010-144	Diode (SI) IS2473-T72
X352	201X2010-144	Diode (SI) IS2473-T72
X353	201X2010-144	Diode (SI) IS2473-T72
X354	201X2010-144	Diode (SI) IS2473-T72
X355	200X8220-851	Diode (Zener) RD10EBI
X366	200X8100-130	Diode (HS) RU-1 0.3 US

MISCELLANEOUS

Ref. No.	Part No.	Description
J301	204X9300-958	Socket, 6 Pin
J302	204X9300-958	Socket, 6 Pin
P301	204X9601-195	Plug, 6 Pin
P302	204X9601-195	Plug, 6 Pin
TH301	201X0000-534	Thermistor

TRANSFORMERS & COILS

Ref. No.	Part No.	Description
L351	201X5200-091	Coil, Horiz. Osc.

POWER BOARD (MV)

RESISTORS

Ref. No.	Part No.	Description
R501	204X1725-052	180 Ohm, ± 10%, 15W WW
R502	203X6000-608	100 Ohm, ± 5%, 1/8W Carbon
R503	203X6000-960	1k Ohm, ± 5%, 1/8W Carbon
R504	203X6000-879	560 Ohm, ± 5%, 1/8W Carbon
R505	203X9014-965	39k Ohm, ± 5%, 1W M.O.
R506	203X6500-842	6.8k Ohm, ± 5%, 1/8W Carbon
R551	203X6500-420	120 Ohm, ± 5%, 1/8W Carbon
VR501	204X2050-001	Varistor Vert. Adj.

CAPACITORS

Ref. No.	Part No.	Description
C501	203X0040-020	10 uF, 160V Electrolytic
C502	202X7000-281	1500 pF, 50V, ± 10% Ceramic
C503	203X0010-011	22 uF, 16V Electrolytic
C551	203X0005-046	220 uF, 10V Electrolytic

SEMICONDUCTORS

Ref. No.	Part No.	Description
TR501	200X3174-006	Transistor, 2SC1740Q
△★TR502	200X3145-404	Transistor, 2SC1454
TR551	200X3172-305	Transistor, 2SC1723
X501	201X2230-042	Diode, (SI) Zener EQB01-06V
X502	201X2010-144	Diode, (SI) IS2473-T72

MISCELLANEOUS

Ref. No.	Part No.	Description
J501	204X9300-958	Socket, 6 Pin
P501	204X9601-195	Plug, 6 Pin
TH501	201X0000-618	Thermistor

RESISTORS

Ref. No.	Part No.	Description
R401	203X6500-709	1.8k Ohm ± 5% 1/8W Carbon
R402	203X6500-709	1.8k Ohm ± 5% 1/8W Carbon
R403	203X6500-709	1.8k Ohm ± 5% 1/8W Carbon
R404	203X6500-447	150 Ohm ± 5% 1/8W Carbon
R405	203X6500-481	220 Ohm ± 5% 1/8W Carbon
R406	203X6500-447	150 Ohm ± 5% 1/8W Carbon
R407	203X6500-508	270 Ohm ± 5% 1/8W Carbon
R408	203X6500-508	270 Ohm ± 5% 1/8W Carbon
R409	203X6500-800	4.7k Ohm ± 5% 1/8W Carbon
R410	203X6500-800	4.7k Ohm ± 5% 1/8W Carbon
R411	203X6500-800	4.7k Ohm ± 5% 1/8W Carbon
R412	203X9104-809	12k Ohm ± 5% 2.0W Metal Oxide
R413	203X9104-809	12k Ohm ± 5% 2.0W Metal Oxide
R414	203X9104-809	12k Ohm ± 5% 2.0W Metal Oxide
R415	203X5601-313	2.7k Ohm ± 10% 1/2W Comp.
R416	203X5601-313	2.7k Ohm ± 10% 1/2W Comp.
R417	203X5601-313	2.7k Ohm ± 10% 1/2W Comp.
R418	203X5602-254	470k Ohm ± 10% 1/2W Comp.
R419	203X5602-185	330k Ohm ± 10% 1/2W Comp.
R422	203X9105-117	1.0 Ohm ± 10% 2W Metal Oxide
R423	203X5102-155	270k Ohm ± 5% 1/4W Comp.
VR401	204X2115-014	500 Ohm Varistor R Drive
VR402	204X2115-014	500 Ohm Varistor B Drive
VR403	204X2115-006	5k Ohm Varistor R Cutoff
VR404	204X2115-006	5k Ohm Varistor G Cutoff
VR405	204X2115-006	5k Ohm Varistor B Cutoff
VR406	204X2000-025	1M Ohm Varistor Screen

CAPACITORS

Ref. No.	Part No.	Description
C401	202X7000-247	1000 pF, 50V, 10% Ceramic
C402	202X7000-247	1000 pF, 50V, 10% Ceramic
C403	202X7000-247	1000 pF, 50V, 10% Ceramic
C404	202X7110-019	1500 pF, 2kV ± 10% Ceramic
C405	202X7150-018	100 pF, 12kV, ±10% Ceramic
C406	202X7050-483	.01 uF, 500V, ±10% Ceramic
C407	202X7110-019	1500 pF, 2kV ± 10% Ceramic
C408	202X8000-550	68 pF, 50V, ± 10% Ceramic
C409	202X8000-550	68 pF, 50V, ± 10% Ceramic
C410	202X8000-550	68 pF, 50V, ± 10% Ceramic

SEMICONDUCTORS

Ref. No.	Part No.	Description
TR401	200X3206-800	Transistor, 2SC2068, 2SC1514 (R output)
TR402	200X3206-800	Transistor, 2SC2068, 2SC1514 (G output)
TR403	200X3206-800	Transistor, 2SC2068, 2SC1514 (B output)
X404	201X2100-126	Diode, IS2367 (protector)
X405	201X2100-126	Diode, IS2367 (protector)
X406	201X2100-126	Diode, IS2367 (protector)

MISCELLANEOUS

Ref. No.	Part No.	Description
J401	206X5003-729	Socket, 5 Pin
J402	206X5003-983	Socket, 3 Pin
P401	204X9600-329	Plug, 5 Pin
P402	204X9600-254	Plug, 3 Pin

△★ 297X2000-072 HIGH VOLTAGE ASSEMBLY (T701)

Ref. No.	Part No.	Description
△★R701	204X1625-058	3.3 Ohm, ± 10% 10W WW Resistor
VR702	204X3901-125	Focus Control
X701		Diode (SI HV) }
X702		Diode (SI HV) } Part of T701
X703		Diode (SI HV) }

FINAL ASSEMBLY PARTS

Ref. No.	Part No.	Description
△★	88X-0129-506	19VJTP22 Pix Tube
	38A5554-000	Assy. Purity Shld/Degaussing
	205X9800-256	Lateral/Purity Assembly
△★	202X1110-810	Yoke, Deflection
	208X2000-946	CRT Socket
	297X2000-072	HV Unit (T701)
	6A0397	Plug, Line Cord
	9A2753-003	Degaussing Coil (L701)

INTERFACE BOARD (P305)

(MODEL 19K4606)

RESISTORS

Ref. No.	Part No.	Description
R201	340X3910-934	91 Ohm, 5%, 1/2W Carbon
R203	340X3102-934	1k Ohm, 5%, 1/2W Carbon
R204	340X2101-934	100 Ohm, 5%, 1/4W Carbon
R206	340X3331-944	330 Ohm, 10%, 1/2W Carbon
R207	340X3102-934	1k Ohm, 5%, 1/2W Carbon
R208	340X3152-934	1.5k Ohm, 5%, 1/4W Carbon
R209	340X2101-934	100 Ohm, 5%, 1/4W Carbon
R210	340X3102-934	1k Ohm, 5%, 1/2W Carbon
R211	340X2331-934	330 Ohm, 5%, 1/4W Carbon
R212	340X2331-934	330 Ohm, 5%, 1/4W Carbon
R213	340X2331-934	330 Ohm, 5%, 1/4W Carbon
R214	340X2201-934	200 Ohm, 5%, 1/4W Carbon
R215	340X2201-934	200 Ohm, 5%, 1/4W Carbon
R216	340X2201-934	200 Ohm, 5%, 1/4W Carbon
VR201	40X0590-017	1.5k Ohm, Black Level Control

CAPACITORS

Ref. No.	Part No.	Description
C201	45X0524-038	1000 uF, 16V Electrolytic

SEMICONDUCTORS

Ref. No.	Part No.	Description
TR201	86X0121-001	Transistor (NPN)
TR202	86X0121-001	Transistor (NPN)
TR203	86X0121-001	Transistor (NPN)
TR204	86X0066-001	Transistor (PNP)
TR205	86X0066-001	Transistor (PNP)
TR206	86X0066-001	Transistor (PNP)
TR207	86X0121-001	Transistor (NNP)
TR208	86X0121-001	Transistor (NPN)
TR209	86X0121-001	Transistor (NPN)
ZD201	66X0040-018	Diode, Zener, 6.8v, 5%, 0.5W
ZD202	66X0040-019	Diode, Zener, 3.9v, 5%, 0.5W

MISCELLANEOUS

Ref. No.	Part No.	Description
J201	204X9300-958	Socket, 6 Pin
J202	204X9300-958	Socket, 6 Pin
J203	206X5019-207	Socket, 4 Pin
P201	204X9601-195	Plug, 6 Pin
P202	204X9601-195	Plug, 6 Pin
P203	204X9600-845	Plug, 4 Pin
P205	6A0393-006	Plug, 6 Pin

Schematic Notes

Unless otherwise specified

Resistance: (Ω) (K→KΩ, M→MΩ), 1/4 (W) carbon resistor

Capacitance: 1 or higher→ (pF), less than 1→ (μF)

      working voltage→ 50 (V)

      ceramic capacitor

Inductance: (μH)

Electrolytic Cap: Capacitance Value (μF)/working voltage (V),

    NP → non-polar (or bipolar) electrolytic cap.

Refer to the parts list for additional component information.

⊕   indicates test point connection

⊥   indicates chassis ground unless otherwise specified

Hz   indicates cycles per second

For **safety** purposes (and continuing reliability)

⚠   replace all components marked with safety symbol with identical type.

    NOTE: FR → fusible resistor

Parts identification on circuit boards:

    e.g. SU1126A (R107 = R1107)

    SU3030A (R113 = R3113)

00-4147-04
G07-CB0

SU-1133A MAIN PCB ASSY

SU-3032A CRT SOCKET PCB ASSY

X101~X103 R,G,B VIDEO OUTPUT 2SC2611 or 2SC1514V

X101,X103 and X105 VIDEO AMP. 2SC454C
X102,X104 and X106 VIDEO AMP. 2SA673C

X301,X302,X305,X306 SYNC AMP 2SC454C or 2SC1685

X303 BEAM LIMITER 2SA673

X304 BLANKING 2SC454C or 2SC1685

X901 POWER DRIVE 2SC2688
X902 ERROR AMP 2SC1890

X04 2SC1106A, 2SC1454 POWER REGULATOR

IC501 HA11244 H.AFC and H&V OSC

X701 X-RAY PROTECTOR 2SC454C or 2SC1685

X501 H.DRIVE 2SC1507, 2SC2371V 2SC2611 or 2SC2610BK

X01 H OUT 2SD898 or 2SD869 or 2SD820

X401,X402 2SD476

AC120V 60Hz/50Hz ±10%

DY01 DEFLECTION YOKE

V01 19VJTP22

REPLACEMENT PARTS LIST - ELECTROHOME 19" MONITOR

Components identified by the ⚠ symbol in the PARTS LIST and on the Schematic have special characteristics important to safety.

DO NOT degrade the safety of the set through improper servicing.

Abbreviations for Resistors and Capacitors

Resistor			Capacitor		
C R	:	Carbon Resistor	C Cap.	:	Ceramic Capacitor
Comp. R	:	Composition Resistor	M Cap.	:	Mylar Capacitor
OM R	:	Oxide Metal Film Resistor	E Cap.	:	Electrolytic Capacitor
V R	:	Variable Resistor	BP E Cap.	:	Bi-Polar (or Non-Polar)
MF R	:	Metal Film Resistor			Electrolytic Capacitor
CMF R	:	Coating Metal Film Resistor	MM Cap.	:	Metalized Mylar Capacitor
UNF R	:	Nonflammable Resistor	PP Cap.	:	Polypropylene Capacitor
F R	:	Fusible Resistor	MPP Cap.	:	Metalized PP Capacitor
			PS Cap	:	Polystyrol Capacitor
			Tan. Cap.	:	Tantal Capacitor

NOTE: When ordering replacement parts please specify the part number as shown in this list including part name, and model number. Complete information will help expedite the order.

Use of substitute replacement parts which do not have the same safety characteristics as specified, may create shock, fire or other hazards. For maximum reliability and performance, all parts should be replaced by those having identical specifications.

SERVICE REPLACEMENT PARTS LIST

Symbol	Description	Part Number
	Main P.C.B. Ass'y	SU-1133A
	CRT Socket P.C.B. Ass'y	SU-3032A
	Purity Shield Ass'y	07-220083-03

Outside of the P.C.B. Ass'y

Symbol	Description	Part Number
	Picture Tube 19"	17-7198-03
⚠	⚠Deflection Yoke	A29779-D = 21-141-01
	PC Magnet	A75034-B = 29-32-01
⚠	⚠Flyback Transf.	A29951-B
⚠	⚠HVR	A46600-A
R05	UNF Resistor 220Ω,25W K	QRF258K-221
C04	C Capacitor 150pF, AC1.5KV	QCZ0101-005
X01	Si. Transistor	2SD870
X02	Si. Transistor	2SC1106A
SC	Screw #8-⅜	31-610818-06
SC	Screw ¼ x ¾ Pix Tube Mtg. (4)	31-601418-12
WA	Pyramidal Lock Washer (4)	33-255-01
	Nut Retainer, Pix Tube Mtg. (4)	33-494-01
	Clip — P.C.B. Support	33-629-02
	Standoff	33-670-010R-02
	Wire Terminal (Gnd. Strap)	34-228-03
	Terminal Lug (Gnd.)	34-33-04
	Groundstrap Assy.	34-574-02
	Grounding Spring	35-212-03
	Wire Hook (Gnd. Strap)	35-3053-02
	Purity Shield Holddown Clamp	35-2348-01
	Support Brkt. RH	35-3890-01
	Support Brkt. LH	35-3890-02
	Chassis Base	38-449-02
	Yoke Wedge (3)	39-1233-01

Purity Shield Ass'y. Parts List

Symbol	Description	Part Number
	Degaussing Coil	21-1007-30
D911, D912	Rectifier 1 Amp 600V (2)	28-22-27
	Pin Terminal (2)	34-708-01
	Pin Terminal Housing	34-709-01
	Purity Shield (2 pcs.)	35-3847-01
	Purity Shield (2 pcs.)	35-3847-02
C911	Capacitor 100nF 10% 400V	48-171544-62
R921	Resistor, Wirewound 33Ω, 4W	42-113301-03
	Fire Retardent Term. Strip 4 Lug	34-492-09

CRT Socket P.C.B. Ass'y (SU-3032A) Parts List

Resistors

Symbol	Description			Part Number
R3105	V	R	200	QVZ3234-022
R3106	V	R	200	QVZ3234-022
R3113	V	R	5K	QVZ3234-053
R3114	V	R	5K	QVZ3234-053
R3115	V	R	5K	QVZ3234-053
R3116	OM	R	10KΩ2W J	QRG029J-103
R3117	OM	R	10KΩ2W J	QRG029J-103
R3118	OM	R	10KΩ2W J	QRG029J-103
R3119	Comp.	R	3.3KΩ½W K	QRZ0039-332
R3120	Comp.	R	3.3KΩ½W K	QRZ0039-332
C3121	Comp.	R	3.3KΩ½W K	QRZ0039-332

Capacitors

Symbol	Description			Part Number
C3107	E	Cap.	10uF 250V A	QEW53EA-106
C3108	C	Cap.	1000pF DC1400V P	QCZ9001-102M

Coils

Symbol	Description	Part Number
L3101	Peaking Coil	QQL043K-101

Semiconductors

Symbol	Description	Part Number
X3101	Si. Transistor	2SC1514VC
X3102	Si. Transistor	2SC1514VC
X3103	Si. Transistor	2SC1514VC

Miscellaneous

Symbol	Description	Part Number
⚠	⚠CRT Socket	A76068

Main PCB Ass'y (SU-1133A) Parts List

Resistors

Symbol	Description			Part Number
R1406	V	R	200Ω	QVZ3230-002
R1408	V	R	200Ω	QVZ3230-002
R1410	CMF	R	6.8Ω1W J	QRX019J-6R8
R1414	OM	R	3.3KΩ1W J	QRG019J-332
R1415	OM	R	2.7KΩ1W J	QRG019J-272
R1421	OM	R	12KΩ2W J	QRG026J-123Z
R1422	V	R	10KΩ	QVZ3230-014
⚠FR1401	⚠F	R	68Ω2W K	QRH024K-680M
⚠R1503	⚠CMF	R	11.8KΩ¼W +1%	QRV142F-1182
R1504	V	R	5KΩ	QVZ3230-053
R1509	OM	R	10KΩ2W J	QRG026J-103Z
R1512	OM	R	8.2KΩ2W J	QRG026J-822Z
R1514	OM	R	820Ω2W J	QRG026J-821Z
R1515	CMF	R	8.2Ω1W J	QRX019J-8R2
R1522	CMF	R	4.7Ω1W J	QRX019J-4R7
R1523	OM	R	68Ω2W J	QRG026J-680Z
R1528	OM	R	390Ω1W J	QRG019J-391
R1534	ZN	R		ERZ-C05ZK471
VR1501	ZN	R		ERZ-C05DK271
⚠R1703	⚠CMF	R	39Ω½W +1%	QRV122F-3902
⚠R1704	⚠CMF	R	7.68KΩ¼W +1%	QRV142F-7681
⚠R1901	⚠Posistor			A75414
R1902	UNF	R	2Ω7W K	QRF076K-2R0
R1903	CMF	R	4.7Ω3W J	QRX039J-4R7
R1904	OM	R	10KΩ2W J	QRG026J-103Z
R1905	OM	R	18KΩ1W J	QRG019J-183
⚠Q1908	⚠CMF	R	47Ω½W +1%	QRV122F-470Z
⚠R1909	V	R	2KΩ	QVP5A0B-023E
R1910	⚠CMF	R	2.74KΩ¼W +1%	QRV142F-274I
⚠FR1901	⚠F	R	220Ω½W K	QRH124K-221M

Capacitors

Symbol	Description		Part Number
C1301	BPE	Cap. 3.3uF 50V A	QEN61HA-335Z
C1402	Tan.	Cap. 2.2uF 16V K	QEE51CK-225B
C1407	E	Cap. 4.7uF 6.3V A	QEW51JA-475
C1411	E	Cap. 100uF 160V A	QEW52CA-107
C1412	E	Cap. 3.3uF 160V A	QEW52CA-335
C1508	PP	Cap. 5600uF 50V J	QFP31HJ-562
⚠C1512	⚠PP	Cap. 2000pF DC1500V J	QFZ0082-202
⚠C1513	⚠PP	Cap. 2000pF DC1500V J	QFZ0082-202
⚠C1514	⚠PP	Cap. 2000pF DC1500V J	QFZ0082-202
C1515	PP	Cap. 0.53uF DC1200V J	QFZ0067-534
C1520	BPE	Cap. 3.3uF 50V A	QEN61HA-335Z
C1523	E	Cap. 1uF 160V A	QEW62CA-105Z
C1524	M	Cap. 0.1uF 200V K	QFM720K-104M
⚠C1531	⚠PP	Cap. 2000pF DC1500V J	QFZ0082-202
⚠C1532	⚠PP	Cap. 1500pF DC1500V J	QFZ0082-152
C1904	E	Cap.	QEY0034-001
C1905	E	Cap. 10uF 250V A	QEW52EA-106

Coils

Symbol	Description	Part Number
L1502	Linarity Coil	A39835
L1503	Width Coil	C30380-A
L1504	Heater Choke	C30445-A

Transformers

Symbol	Description	Part Number
T1501	Hor. Drive Transf.	A46022-BM
T1503	Side Pin Transf.	C39050-A

Semiconductors

Symbol	Description	Part Number
IC1501	IC	HA11244
X1101	Si. Transistor	2SC1685(R)
X1102	Si. Transistor	2SA673(C)
X1103	Si. Transistor	2SC1685(R)
X1104	Si. Transistor	2SA673(C)
X1105	Si. Transistor	2SC1685(R)
X1106	Si. Transistor	2SA673(C)
X1301	Si. Transistor	2SC1685(R)
X1302	Si. Transistor	2SC1685(R)
X1303	Si. Transistor	2SA673(C)
X1304	Si. Transistor	2SC1685(R)
X1305	Si. Transistor	2SC1685(R)
X1401	Si. Transistor	2SD478
X1402	Si. Transistor	2SD478
X1501	Si. Transistor	2SC2610BK
X1901	Si. Transistor	2SC2688 (K.L.M.)
X1902	Si. Transistor	2SC1890A (E.F.)
D1101	Si. Diode	W06A
D1102	Si. Diode	W06A
D1103	Si. Diode	W06A
D1301	Si. Diode	1SZ473H
D1401	Si. Diode	1SZ473H
D1402	Zener Diode	RD10F(C)
D1503	Si. Diode	HF-1
D1504	Si. Diode	V09E
D1505	Zener Diode	RD11E(B)
D1506	Si. Diode	W06A
D1507	Si. Diode	1SS81
D1508	Si. Diode	1SZ473H
⚠D1701	⚠Zener Diode	RD20EV2
⚠D1901	⚠Si. Diode	1S1887A
⚠D1902	⚠Si. Diode	1S1887A
⚠D1903	⚠Si. Diode	1S1887A
⚠D1904	⚠Si. Diode	1S1887A
⚠D1905	⚠Zener Diode	RD6.8EV3

Miscellaneous

Symbol	Description	Part Number
⚠F1901	⚠Fuse 1.25A	QMF53U1-1R25S
⚠F1902	⚠UL Fuse 3A	QMF66U1-3R0S

Schematic Notes

Unless otherwise specified

Resistance: (Ω) (K→KΩ, M→MΩ), 1/4 (W) carbon resistor

Capacitance: 1 or higher→ (pF), less than 1→ (μF)

working voltage → 50 (V)

ceramic capacitor

Inductance: (μH)

Electrolytic Cap: Capacitance Value (μF)/working voltage (V),

NP → non-polar (or bipolar) electrolytic cap.

Refer to the parts list for additional component information.

⊕   indicates test point connection

⊥   indicates chassis ground unless otherwise specified

Hz   indicates cycles per second

For **safety** purposes (and continuing reliability)

⚠   replace all components marked with safety symbol with identical type.

NOTE: FR → fusible resistor

Parts identification on circuit boards:

e.g. SU1126A (R107 = R1107)

SU3030A (R113 = R3113)

G07-FBO

00-4147-03

6-18

REPLACEMENT PARTS LIST - ELECTROHOME 13'' MONITOR

Components identified by the ⚠ symbol in the PARTS LIST and on the Schematic have special characteristics important to safety.

DO NOT degrade the safety of the set through improper servicing.

Abbreviations for Resistors and Capacitors

Resistor			Capacitor		
C R	:	Carbon Resistor	C Cap.	:	Ceramic Capacitor
Comp. R	:	Composition Resistor	M Cap	:	Mylar Capacitor
OM R	:	Oxide Metal Film Resistor	E Cap.	:	Electrolytic Capacitor
V R	:	Variable Resistor	BP E Cap.	:	Bi-Polar (or Non-Polar)
MF R	:	Metal Film Resistor			Electrolytic Capacitor
CMF R	:	Coating Metal Film Resistor	MM Cap.	:	Metalized Mylar Capacitor
UNF R	:	Nonflammable Resistor	PP Cap.	:	Polypropylene Capacitor
F R	:	Fusible Resistor	MPP Cap.	:	Metalized PP Capacitor
			PS Cap	:	Polystyrol Capacitor
			Tan. Cap.	:	Tantal Capacitor

NOTE: When ordering replacement parts please specify the part number as shown in this list including part name, and model number. Complete information will help expedite the order.

Use of substitute replacement parts which do not have the same safety characteristics as specified, may create shock, fire or other hazards. For maximum reliability and performance, all parts should be replaced by those having identical specifications.

Symbol	Description	Part Number
	Main P.C.B. Ass'y	SU-1103A
	CRT Socket P.C.B. Ass'y	SU-3016A

Outside of the P.C.B. Ass'y

Symbol	Description	Part Number
⚠V01	⚠Picture Tube	370ESB22(E)
⚠DY01	⚠Deflection Yoke	C29123-V
	PC Magnet	A76366-A
	Wedge	C30006
	⚠Flyback Transf.	A19183-A
⚠R11	⚠Focus V R	A46606-A
⚠R05	UNF Resistor 220Ω, 25W. K	QRF258K-221
⚠C04	⚠C Capacitor 150 pF, AC1.5KV	QCZ0101-005
X01	Si. Transistor	2SD869
IC01	IC Regulator	STR383
L01	Degausing Coil	21-1007-31
	Degausing Coil Pin Terminal (2)	34-708-01
	Degausing Coil Pin Terminal Housing	34-709-01
	Groundstrap Ass'y.	34-697-04
	Groundstrap Wire Terminal	34-228-03
	Groundstrap Spring (2)	35-3560-01
BR	Support Bracket RH	35-3919-01
BR	Support Bracket LH	35-3919-02
SC	SCREW 10-½ Pix Tube Mtg. (4)	31-631018-08
WA	Pyramidal Lockwasher (4)	33-255-01
	Clip P.C.B. Support (2)	33-629-02
	Ground Lug	34-33-04
CH	Chassis Base	38-452-01

Main P.C.B. Ass'y (SU-1103A) Parts List

Resistors

Symbol	Description		Part Number
R1406	V R	200Ω	QVZ3230-022
R1408	V R	200Ω	QVZ3230-022
R1410	CMF R	6.8Ω1W J	QRX019J-6R8
R1414	OM R	3.3KΩ1W J	QRG019J-332
R1415	OM R	2.7KΩ1W J	QRG019J-272
R1421	OM R	12KΩ2W J	QRG029J-123
R1422	V R	10KΩ	QVZ3224-014H
⚠FR1401	⚠F R	68Ω2W K	QRH024K-680M
⚠R1503	⚠CMF R	11.8KΩ¼W +1%	QRV142F-1182
R1504	V R	5KΩ	QVZ3230-053
R1509	OM R	10KΩ2W J	QRG029J-103
R1511	OM R	5.6KΩ2W J	QRG029J-562
R1514	OM R	680Ω2W J	QRG029J-681
R1515	CMF R	8.2Ω1W J	QRX019J-8R2
R1522	CMF R	4.7Ω1W J	QRX019J-4R7
R1523	OM R	56Ω2W J	QRG029J-560
R1528	OM R	390Ω1W J	QRG019J-391
R1534	ZN R		ERZ-C05ZK471
VR1501	ZN R		ERZ-C05DK271
⚠R1703	⚠CMF R	39KΩ½W +1%	QRV122F-3902
⚠R1704	⚠CMF R	7.68KΩ¼W +1%	QRV142F-7681
⚠R1901	⚠Posistor		A75414
R1902	UNF R	2Ω7W K	QRF076K-2R0
R1903	CMF R	5.6Ω3W J	QRX039J-5R6
R1904	OM R	10KΩ2W J	QRG026J-103Z
⚠FR1901	⚠F R	220Ω½W K	QRH124K-221M

Capacitors

Symbol	Description		Part Number
C1402	Tan. Cap.	2.2uF 16V K	QEE51CK-225B
C1411	E Cap.	100uF 160V A	QEW52CA-107
C1412	E Cap.	3.3uF 160V A	QEW52CA-335
C1508	PP Cap.	5600pF 50V J	QFP31HJ-562
C1511	E Cap.	47uF 160V A	QEW52CA-476S
⚠C1512	⚠PP Cap.	2000pF DC1500V J	QFZ0082-202
⚠C1513	⚠PP Cap.	2000pF DC1500V J	QFZ0082-202
⚠C1514	⚠PP Cap.	2500pF DC1500V J	QFZ0082-252
C1515	PP Cap.	0.53uF DC1200V K	QFZ0067-534
C1520	BPE Cap.	1uF 50V A	QEN61HA-105Z
C1524	M Cap.	0.1uF 200V K	QFM72DK-682M
C1904	E Cap.		QEY0034-001
C1905	E Cap.	10uF 250V A	QEW52EA-106
⚠C1907	⚠MM Cap.	0.1uF AC150V Z	QFZ9008-104

Coils

Symbol	Description	Part Number
L1501	Peaking Coil	A75360-6
L1502	Liniarty Coil	A39934
L1503	Width Coil	C30380-A
L1504	Heater Choke	C30333-A
L1901	Line Filter	A39475-J

Transformers

Symbol	Description	Part Number
T1501	Hor. Drive Transf.	A46022-BM
T1503	Side Pin Transf.	C39050-A

Semiconductors

Symbol	Description	Part Number
IC1501	I.C.	HA11244
X1101	Si. Transistor	2SC1685(R)
X1102	Si. Transistor	2SA673(C)
X1103	Si. Transistor	2SC1685(R)
X1104	Si. Transistor	2SA673(C)
X1105	Si. Transistor	2SC1685(R)
X1106	Si. Transistor	2SA673(C)
X1301	Si. Transistor	2SC1685(R)
X1302	Si. Transistor	2SC1685(R)
X1303	Si. Transistor	2SA673(C)
X1304	Si. Transistor	2SC1685(R)
X1305	Si. Transistor	2SC1685(R)
X1401	Si. Transistor	2SD478
X1402	Si. Transistor	2SD478
X1501	Si. Transistor	2SC2610BK
X1701	Si. Transistor	2SC1685(P-S)
D1101	Si. Diode	W06A
D1102	Si. Diode	W06A
D1103	Si. Diode	W06A
D1301	Si. Diode	1S2473H
D1401	Si. Diode	1S2473H
D1402	Zener Diode	RD10F(C)
D1503	Si. Diode	HF-1
D1504	Si. Diode	V09E
D1505	Zener Diode	RD11E(B)
D1506	Si. Diode	W06A
D1507	Si. Diode	1SS81
D1508	Si. Diode	1S2473H
⚠D1701	⚠Zener Diode	RD20EV2
⚠D1901	⚠Si. Diode	1S1887A
⚠D1902	⚠Si. Diode	1S1887A
⚠D1903	⚠Si. Diode	1S1887A
⚠D1904	⚠Si. Diode	1S1887A

Miscellaneous

Symbol	Description	Part Number
⚠F1901	⚠Fuse 1A	QMF53U1-1R0S
⚠F1902	⚠UL Fuse 3A	QMF66U1-3R0S

CRT Socket P.C.B. Ass'y (SU-3016A) Parts List

Resistors

Symbol	Description	Part Number
R3105	V R 200Ω	QVZ3234-022
R3106	V R 200Ω	QVZ3234-022
R3113	V R 5KΩ	QVZ3234-053
R3114	V R 5KΩ	QVZ3234-053
R3115	V R 5KΩ	QVZ3234-053
R3116	OM R 10KΩ2W J	QRG029J-103
R3117	OM R 10KΩ2W J	QRG029J-103
R3118	OM R 10KΩ2W J	QRG029J-103
R3119	Comp. R 3.3KΩ½W K	QRZ0039-332
R3120	Comp. R 3.3KΩ½W K	QRZ0039-332
R3121	Comp. R 3.3KΩ½W K	QRZ0039-332

Capacitors

Symbol	Description	Part Number
C3107	E Cap. 10uF 250V A	QEW52EA-106
C3108	C Cap. 1000pF DC1400V P	QCZ9001-102M

Coils

Symbol	Description	Part Number
L3101	Peaking coil	QQL043K-101

Semiconductors

Symbol	Description	Part Number
X3101	Si. Transistor	2SC2611
X3102	Si. Transistor	2SC2611
X3103	Si. Transistor	2SC2611

Miscellaneous

Symbol	Description	Part Number
⚠	⚠ CRT Socket	A75522

VII Schematics and Wiring Diagrams

POWER SUPPLY BD.
*A084-90414-C935

MT-87 XFORMER

MT-82 XFORMER

220 V.   14.5 V.   VIO
BLU   115 V.   9 V.   RED
COM   YEL
9 V.   RED
14.5 V.   VIO
12 V.   ORN
2 AMP SLO-BLO
COIN DOOR LITES
BRN   0 V.   0 V.   GRY

12 POS
20 POS

BLU   115 V.   115 V.   BLK
2 AMP SLO-BLO
BRN   0 V.   0 V.   WHT
BLK

½ AMP
BLU-O
BRN-O

ON-OFF SW.

SAFETY SW.

FILTER

½ AMP
SLO-BLO

BALLAST

FLUORESCENT LITE
S
BULB # F15T8-CW.

LINE FILTER

BLU
BLU
BLU-GRY
BRN
BLU-GRY
BLU
BRN

G-Y

MONITOR POWER JACK

GND. TO MONITOR, CONTROL, COIN DOOR, ON OFF SW. + SPKRS.

SCHEMATIC # M051-00550-A003

BOSCONIAN U.R.

SPKR
GRN
W-B

LOGIC GND.
Y-B
Y-R
LOGIC GND.
Y-B
Y-W
LOGIC GND.

COIN METER
WHT   W-Y
Y-VIO   CONTROL GND.
SELECT 1 PLYR   BR-B
SELECT 2 PLYR   B-Y
MOVE RIGHT   W-BLU
MOVE LEFT   BLU-W
MOVE UP   R-BLU
MOVE DOWN   O-R
+5V   RED
+5V   RED

TEST   PLAY
YEL   YEL   O-W
TILT SW.   BLU
KEY
CREDIT SW.   W-O
1 COIN SW.   O-G
2 COIN SW.

FILTER BD.
P.C# A084-91408-A508

CPU BD.
P.C# A084-91404-B508

44 POS
44 POS

LOGIC GND.
Y-W   Z
W-R   M

+V. AUDIO   ORN
V. AUDIO RETURN   W-G
+5V.   RED

3 POS
ORN
W-G
RED
3 POS

VIDEO BD.
P.C# A084-91405-B508

RAPID FIRE BD.
P.C# A084-91410-A000

J-2 USED FOR SINGLE FIRE
9 POS
RED
Y-W
W-R
W-BRN   FIRE BOTTON
Y-B
9 POS
J-1 USED FOR RAPID FIRE

RED
BLK
GRN
YEL + SHIELD   GND.
6 POS

RED
BLK
GRN
YEL + SHIELD
6 POS

6 POS

WHT
TAN
3 POS

WHT
4

MONITOR JACKS

KEY

REVISIONS

REVISIONS	DATE CHANGED	NAME
FIRST FINISHED	11-4-81	T. Kawam

NOTES: 1. * = 18 AWG
2. ▲ = 18 AWG 600V. INSUL.

7-1

POWER SUPPLY BD.
A084-91414-C???

KEY 7

220 V.
115 V. BLU
MT-87 XFORMER
14.5 V. VIO * 11
9 V. RED * 6
COM YEL * 1
2
9 V. RED * 4
14.5 V. VIO * 10
2 AMP SLO-BLO
12 V. ORN * 8
INSERT + COIN DOOR LITES
O V. BRN O V. GRY * 12

12 POS

MT-82 XFORMER
115 V. BLU 115 V. BLK *
2 AMP SLO-BLO
BLK
O V. BRN O V. WHT *

MONITOR POWER JACK

ON-OFF SW.

BLU

BLU-GRY BRN
SAFETY SW.

BLU-GRY

2½ AMP SLO-BLO

BLU BRN

LINE FILTER

G-Y

GND TO MONITOR CONTROL, COIN DOOR, ON-OFF SW. + SPKRS

SCHEMATIC # M051-00555-A003

BOSCONIAN MINI

REVISIONS

REVISIONS	DATE CHANGED	NAME
FIRST FINISHED	11-4-8?	

NOTES: 1. * = 18 AWG
2. ▲ = 18 AWG 600 V. INS.

7-2

20 POS

14 Y-B * LOGIC GND. 7
9 Y-R * H
13 Y-B * LOGIC GND. A
12 Y-W * LOGIC GND. 22

8 WHT * COIN METER W-Y 3
5 Y-VIO * CONTROL GND.
SELECT 1 PLYR BR-B L
SELECT 2 PLYR B-Y 10
MOVE RIGHT W-BLU R
MOVE LEFT BLU-W N
MOVE UP R-BLU S
MOVE DOWN O-R P

19 +5 V. RED * F
17 +5 V. RED * 6

KEYS BETWEEN C-D
E-F

TEST PLAY

16 YEL * YEL O-W 8
6 KEY
T.LT. W. BLU
CREDIT SW. W-O J
#1 COIN SW. O-G K
#2 COIN SW.

FILTER BD.
P.C. # A084-91408-A506

15 Y-W * LOGIC GND. Z
W-R M

1 +V. AUDIO ORN * 1
16 V. AUDIO RETURN W-G * 2

18 +5 V. RED * 3

RAPID FIRE BD.
P.C. # A084-91410-A000

J-2 USED FOR SINGLE FIRE
9 POS

9 RED *
6 Y-W *
7 W-R
8 W-BRN FIRE BOTTON
5 Y-B

9 POS

J-1 USED FOR RAPID FIRE

SPKR
GRN * B
W-B * 2

CPU BD.
P.C. # A084-91404-B508

B B
2 2
H H
7 7
A A
22 22
3 3
10 10
R R
N N
F F
6 6
8 8
J J
K K

44 POS

Z Z
M M

3 POS
ORN * 1
W-G * 2
RED * 3

6 POS

VIDEO BD
P.C. # A084-91405-B508

6 RED RED
4 BLK 3 BLK 3
5 GRN 2 GRN 2
3 YEL + SHIELD GND. 5 YEL + SHIELD 5

6 POS 6 POS

3 POS
1 WHT 4 WHT 4
2 TAN

MONITOR JACKS

POWER SUPPLY BD.
A084-90414-C935

MT-91 XFORMER

MT-85 XFORMER

220 V.
14.5 V. VIO
BLU
115 V.
9 V. RED
COM YEL
9 V. RED
14.5 V. VIO
2 AMP SLO-BLO
ORN
COIN DOOR LITES
BRN O V. O V. 9 V. GRY
BLU 115 V. 115 V. BLK
2 AMP SLO-BLO
BLK
BRN O V. O V. WHT

MONITOR POWER JACK

ON-OFF SW.
BLU-O
½ AMP
BRN-O

BLU-GRY BRN
SAFETY SW.

BLU-GRY
2½ AMP SLO-BLO
FAN

BLU BRN

LINE FILTER

O-Y

GND TO MONITOR, CONTROL, COIN DOOR, ON-OFF SW. + SPKRS

SCHEMATIC # M051-00557-A003

BOSCONIAN C.T.

KEY 7
12 POS
20 POS

+5V. RED F
+5V. RED E
SPKR GRN B
W-B 2

Y-B LOGIC GND. 7
Y-R 9
Y-B LOGIC GND. A
Y-W LOGIC GND. 22

WHT COIN METER W-Y 3
Y-VIO CONTROL GND.
SELECT 1 PLYR BR-B
SELECT 2 PLYR B-Y 10
1 PLYR MOVE RIGHT W-BLU R
1 PLYR MOVE LEFT BLU-W N
1 PLYR MOVE UP R-BLU
1 PLYR MOVE DOWN O-R P
2 PLYR MOVE RIGHT W-BLU R
2 PLYR MOVE LEFT BLU-W
2 PLYR MOVE UP Y-G 15
2 PLYR MOVE DOWN G-R

TEST PLAY
YEL YEL O-W
TILT BLU
KEY CREDIT SW. W-O J
1 COIN SW. O-G K
2 COIN SW.

FILTER BD.
PC# A084-91406-A508

Y-W LOGIC GND. Z
W-R M
R-W
+V. AUDIO ORN
V. AUDIO RETURN W-G
+5V. RED

C.P.U. BD.
P.C # A084-91404-B508

44 POS

44 POS

B B
2 2
H H
7 7
A A
22 22
3 3
L L
10 10
R R
N N
F F
6 6
8 8
J J
K K
Z Z
M M

ORN 1
W-G 2
RED 3
3 POS
3 POS

J-2 USED FOR SINGLE FIRE
9 POS
RED
Y-W
W-R
R-W
W-BRN 1 PLYR FIRE BUTTON
Y-B
R-Y 2 PLYR FIRE BUTTON
W-G
KEY
9 POS
J-1 USED FOR RAPID FIRE

RAPID FIRE BD.
PC# A084-91410-A000

RED
BLK
GRN
YEL + SHIELD GND.
6 POS

WHT
TAN
3 POS

MONITOR JACKS

VIDEO BD
P.C# A084-91405-B508

RED
BLK
GRN
YEL + SHIELD
6 POS

WHT

REVISIONS
REVISIONS | DATE CHANGED | NAME
FIRST FINISHED | 11-4-8 |

NOTES: 1. ✳ = # AWG
2. ▲ = # AWG

DESIGNATION   DESCRIPTION

DESIGNATION	DESCRIPTION
C1	10000 MF 35V AX. ELEC.
C2	.01 MF 50V AX.CER.
C3	1MF 25V TANT.
C4	20000 MF 16V AX. ELEC.
C5	100 PF 50V AX.CER
C6	470 MF 16V AX. ELEC.
C7	4700 MF 25V "
R1	470 OHM 1/4W 5% CRBN
R2	100 " " " " "
R3	2.7K " " " " "
R4	560 " " " " "
R5	510 " " " " "
R6	10 " " " " "
VR1	100 OHM 1/4W CRBN. FLM.
D1, D2	A14F
D3	1N4004
D4, D5	MR750
D6-D9	A15F
D10	A14F
Q1	TIP31
Q2	2N3055
U1	LM317
U2	3532
L1	FERROXCUBE BEAD
HS1	HEAT SINK
F1	FUSE 2A
F2	" 8A
F3	" 6A
FC1A,FC1B,FC2A	FUSECLIP W/ STOP
FC2B,FC3A,FC3B	" "
J1	CONN. KK.156 (RA)(5-PIN)(6-PIN)
J2	" " (RA)(5-PIN)(13-PIN)
MHQ1	MOUNTING HARDWARE Q1
	(1) SCREW 4-40X10 SLT RND
	(1) WSH.4 120-.250-.018
	(1) HEXNUT 4-40
	(1) SHOULDER WSH. 974-302
	THERMAL COMPOUD AS REQ.
	(1) TO-220 INSULATOR RT-3.5 MICA
MHQ2	MOUNTING HARDWARE Q2
	(2) SCREW 4-40X10 SLT RND
	(2) WSH 4 120- 250-018
	(2) HEXNUT 4-40
	(2) SHOULDER WSH. 974-302
	THERMAL COMPOUD AS REQ.
	(1) TO-3 RT-1.5 FILM
MHU1	MOUNTING HARDWARE U1
	(1)SCREW 4-40X10 SLT RND
	(1) WSH 4 120-.250-018
	(1)HEXNUT 4-40
	(1) SHOULDER WSH. 974-302
	THERMAL COMPOUD AS REQ
	(1) TO-220 INSULATOR RT-3.5 MICA
TW1-TW3	TIE WRAPS
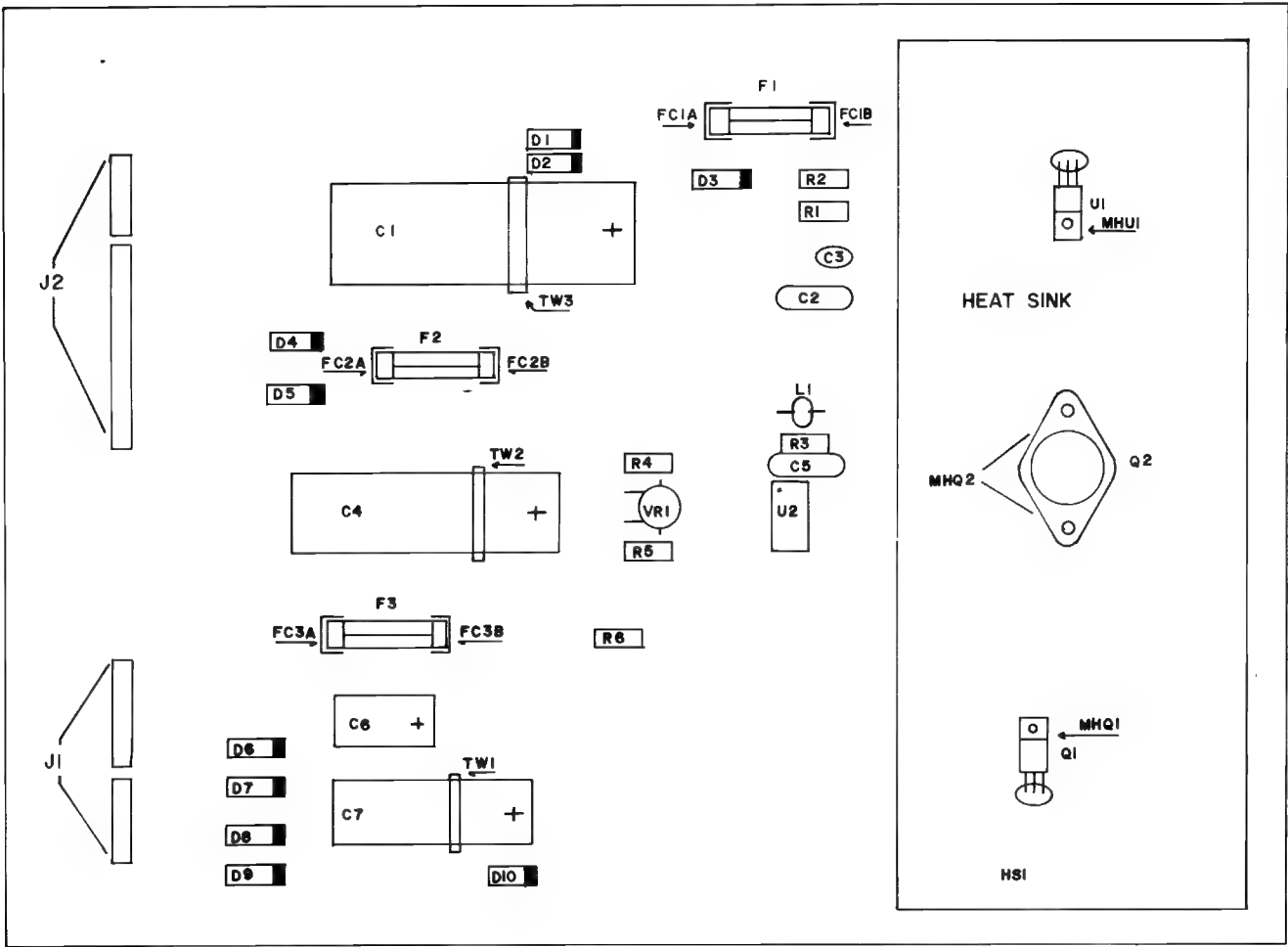
DESCRIPTION	QTY	DESIGNATION	PART NUMBER
100 PF 50v AX.CER.	1	C5	0508-00800-2100
.01MF " " "	1	C2	0171-097H2-JXXX
1MF 25v TANT.	1	C3	0935-00814-0100
470MF " AX.ELEC.	1	C6	0175-271EX-EXXX
4700MF " "	1	C7	0508-00800-2200
10000MF 35v AX.ELEC.	1	C1	0175-322GX-EXBX
20000 16v MF "	1	C4	0935-00814-0800
10 OHM 1/4w 5% CBN	1	R6	0062-051B3-1XXX
100 " " " "	1	R2	0062-110B3-1XXX
470 " " " "	1	R1	0062-156B3-1XXX
510 " " " "	1	R5	0062-159B3-1XXX
560 " " " "	1	R4	0062-162B3-1XXX
2.7K " " " "	1	R3	0062-199B3-1XXX
100 " " CBN FLM	1	VR1	0063-025AX-1DEX
1N4004	1	D3	0508-00801-0200
A14F	3	D1,D2,D10	0064-168XX-XXGX
A15F	4	D6-D9	0064-169XX-XXGX
MR750	2	D4,D5	0064-303XX-XXJX
TIP31	1	Q1	0065-485XX-XXXX
2N3055	1	Q2	0935-00800-0000
3532	1	U2	0066-044BX-XXXX
LM317	1	U1	0935-00804-3600
FERROXCUBE BEAD	1	L1	0017-00009-0225
HEAT SINK	1	HS1	0068-045XX-ABDX
FUSE 2A	1	F1	0017-00003-0005
FUSE 6A	1	F3	0017-00003-0008
FUSE 8A	1	F2	0017-00003-0184
FUSECLIP	6	FC1A,FC1B,FC2A, FC2B,FC3A,FC3B	0017-00003-0214
KK 156 (RA) (5)	2	J1,J2	3000-16387-0500
KK 156 (RA) (6)	1	J1	3000-16387-0600
KK 156 (RA) (13)	1	J2	3000-16387-1300
SCREW 4-40x10	4	MHU1,MHQ1,MHQ2	0017-00101-0727
WSH 4 120-.250-018	4	" " "	0017-00104-0071
HEXNUT 4-40	4	" " "	0017-00103-0002
SHOULDER WSH	4	" " "	0017-00042-0109
THERMAL COMPOUND	AS REQ.	" " "	0017-00009-0204
TO-220,INSULATOR	2	MHU1,MHQ1	0017-00003-0205
TO-3 INSULATOR	1	MHQ2	0017-00042-0108
TIE WRAPS	3	TW1-TW3	0017-00042-0105
PCB	1	———	A080-90414-C935

DIM TOLERANCES
UNLESS OTHERWISE SPEC
CONCENTRICITY T.I.R .002
FRACTIONAL ± 1/64
DECIMAL ± .005
HOLE DIA .002 .000
ANGLE ± 1/2°
DO NOT SCALE DWG

RALLY-X
DRN MMM DATE 2/9/82
MIDWAY MFG. CO.
FRANKLIN PK, IL 60131 A BALLY CO.
ASSEMBLY DRWNG
PWR. SUPP.
A084-90414-C935
REVISIONS
PART NO. M051-00935-C028

POWER SUPPLY

MIDWAY MFG. CO.
FRANKLIN PK ILL
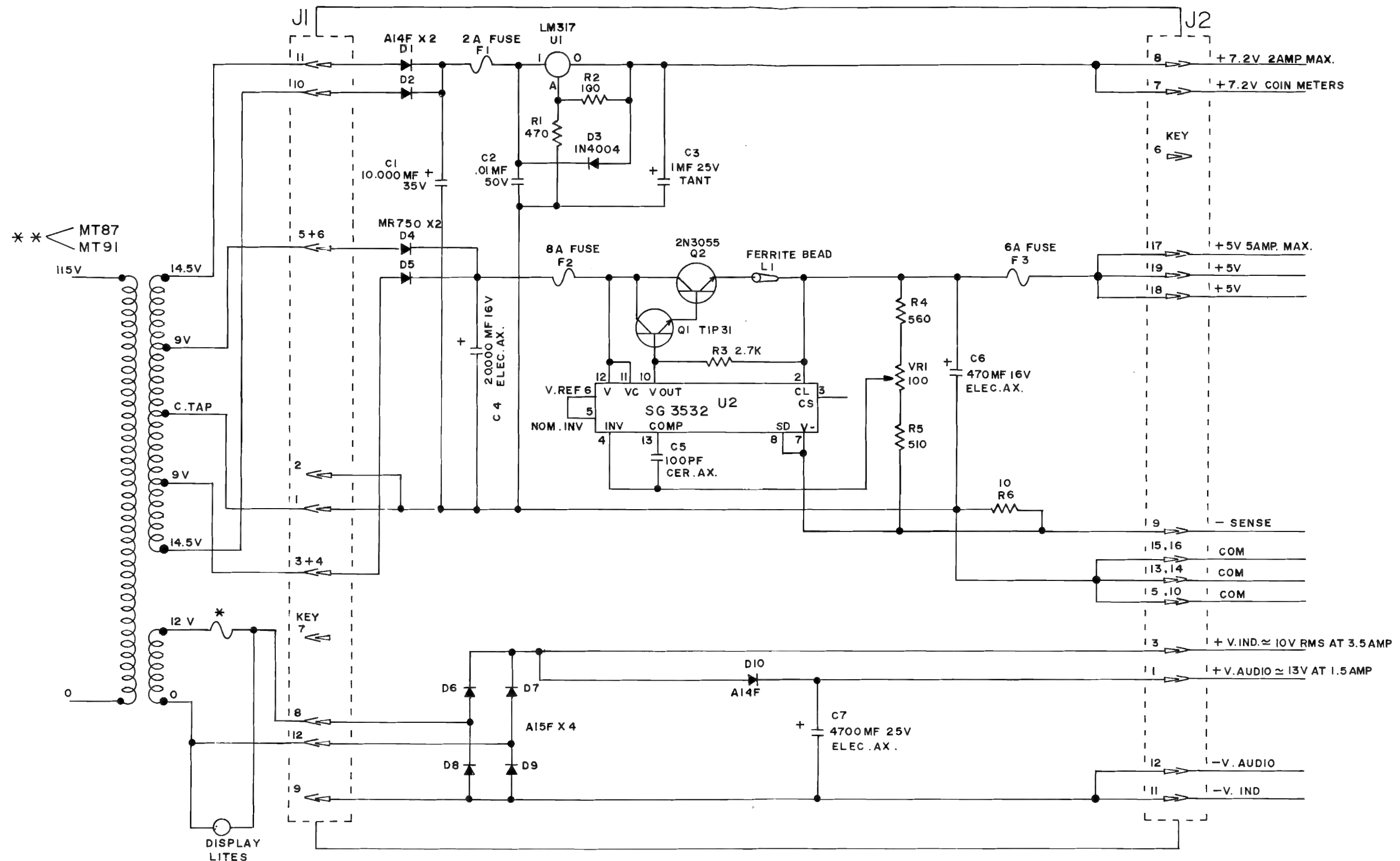
NOTES:
* 2 AMP FUSE W/O DISPLAY LITES
** MT87 FOR UR.
MT91 FOR C.T.

DO NOT SCALE DWG	HEAT TREAT	SCALE FULL	USED ON RALLY-X	MIDWAY MFG. CO.
DIM TOLERANCES UNLESS SPECIFIED	DRN m.m.	MAT L	NO REQ'D 1 PER	FRANKLIN PK ILL
CONCENTRICITY T.I.R .003	CKD	FINISH	SCHEMATIC	ART NO
FRACTIONAL ±1/64			POWER SUPPLY	M051 — 00935 — 0025
DECIMAL .005				
HOLE DIA +.002 .000 DATE 2-10-82			A084-90414-C935	

7-5

DESIGNATION LIST

DESIGNATION	DESCRIPTION
C1,C2	.IMF 100V MYLAR
C3-C7	.0IMF 25V AX CER
R1-R4	1MEG OHM 1/4w 5% CRBN RES
R5	1K " " " " "
R6	68 " " " " "
R7	1K " " " " "
R8	68 " " " " "
U1	LM556
U2	7400
J1,J2	KK.156 VERT 2(6-PIN)2(2-PIN)
MH1-MH4	SNAP BUSHING 1/4"
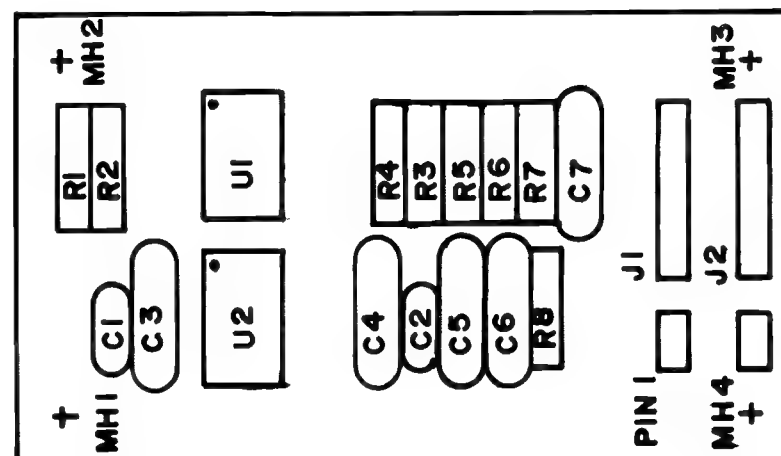
CROSS REFERENCE LIST

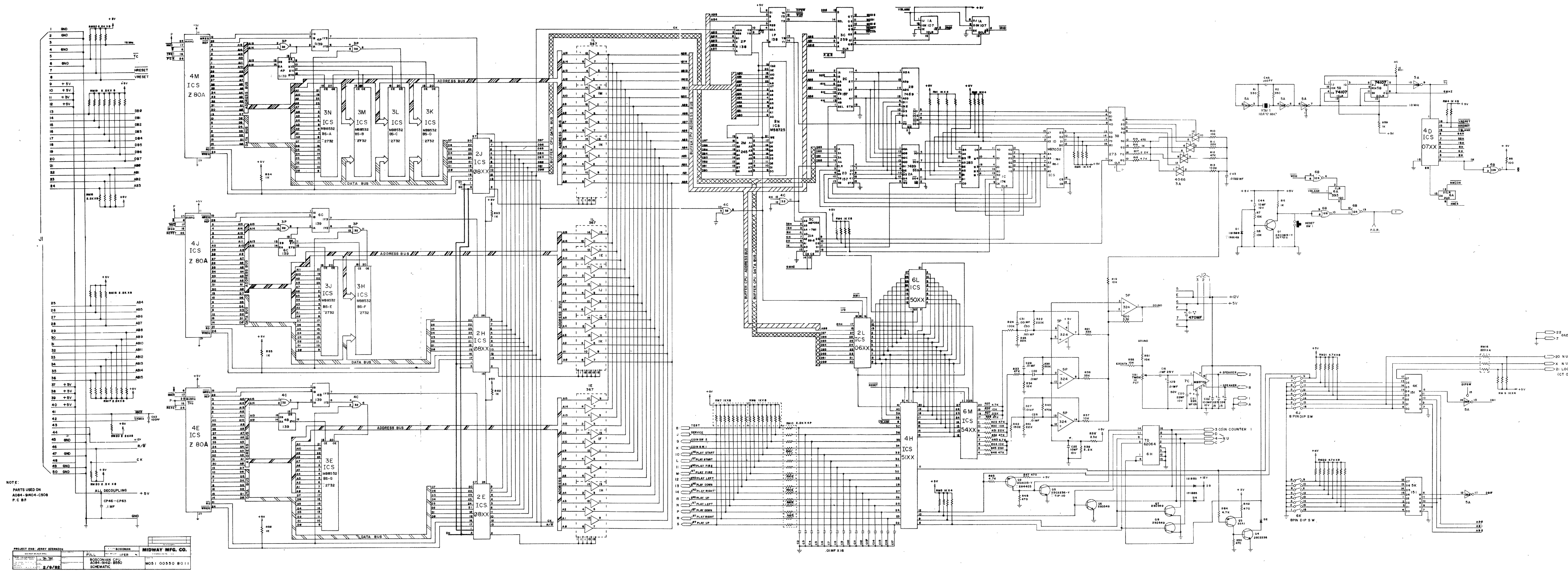| DESCRIPTION	QUANTITY	DESIGNATION	PART #
.0IMF 25VAX CER	5	C3-C7	0508-00800-0800
.IMF 100V 10% MYLAR	2	C1, C2	0508-00800-2300
68 OHM 1/4w 5% CRBN RES.	2	R6,R8	0062-098B3-1XXX
1K " " " " "	2	R5,R7	0062-179B3-1XXX
1MEG " " " " "	4	R1-R4	0062-323B3-1XXX
LM556	1	U1	0508-00803-5500
7400	1	U2	0508-00803-5600
KK.156 CON. (2-PIN)	2	J1,J2	3000-16335-0200
(6-PIN)	2	J1,J2	3000-16335-0600
MOUNTING HARDWARD SNAP BUSHING 1/4"	4	MH1-MH4	0017-00042-0014
RAPID FIRE P.C	1	A080-91410-A000	A080-91410-A000

PROJECT ENG: JERRY SZERSZEN

DIM. TOLERANCES
UNLESS OTHERWISE SPEC
CONCENTRICITY T.I.R   .002
FRACTIONAL   ± 1/64
DECIMAL   ± .005
HOLE DIA   + .002 -- .000
ANGLE   ± 1/2°
DO NOT SCALE DWG

GALAGA

mm DATE 09-30-81 SCALE FULL

MIDWAY MFG. CO.
FRANKLIN PK., IL. 60131   A BALLY CO.

RAPID FIRE P.C.
ASSEMBLY DRAWING
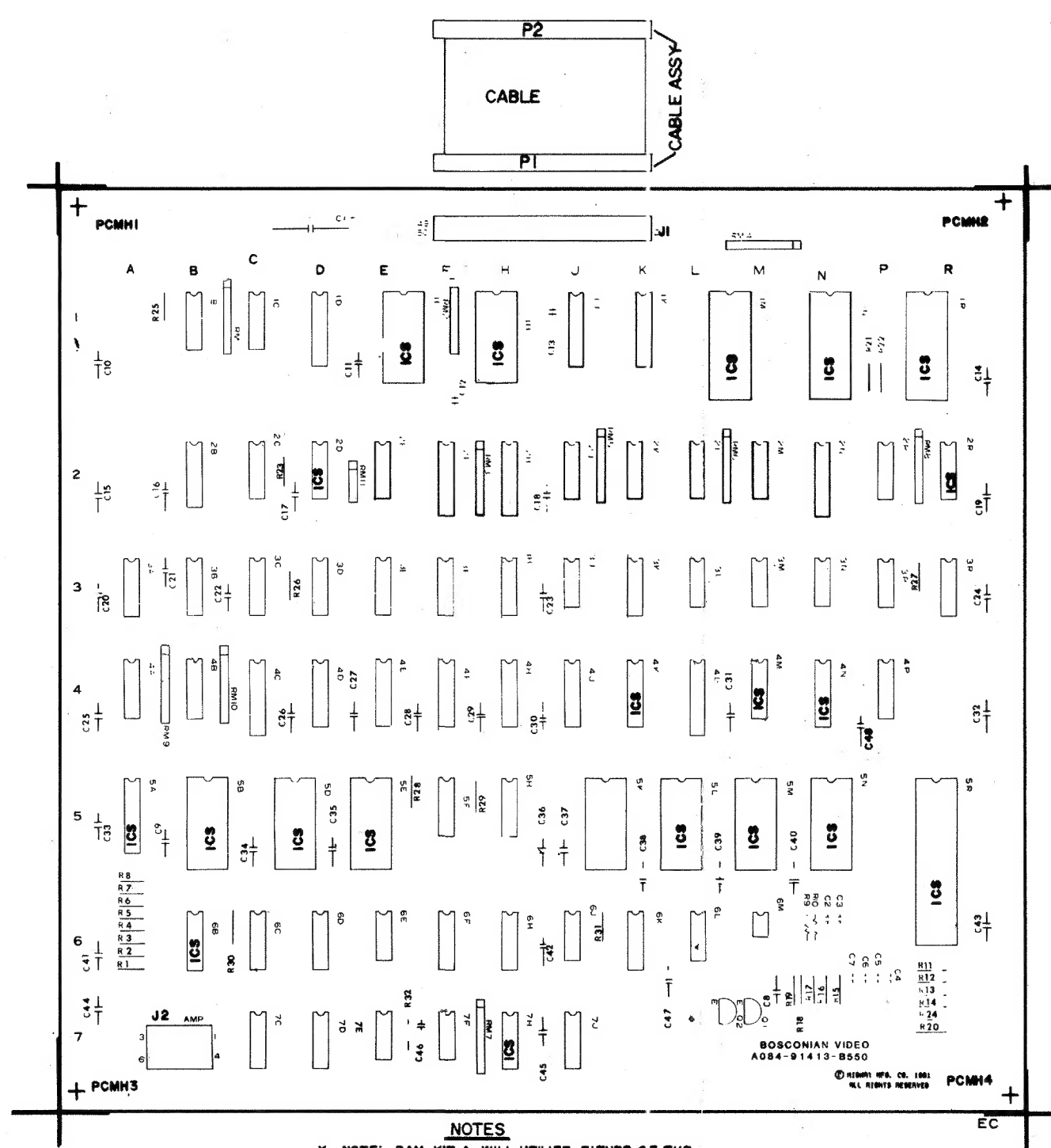A082-91410-A000

REVISIONS

PART NO
M0.5.1-0.0.1.1.4-A.0.0.1

+5v

R1
1 MEG OHM

R2
1 MEG OHM

C1
.1 MF
MYLAR 10%

+5v

+5v

R3
1 MEG OHM

R4
1 MEG OHM

C2
.1 MF
MYLAR 10%

DIS 1

THRES 2

TRIG 6

U1
LM556

RES 4

OUT 5

CNTL VOL

C3
.01 MF

7

13 DIS

12 THRES

8 TRIG

10 RES

9 OUT

CNTL VOL

11

C4
.01 MF

8

U2
7400

9

10

+5v

R5
1K

C5
.01 MF

R6
68 OHM

12

13

U2

11

1

2

U2

3

6

U2
5

4

+5v

R7
1K

C6
.01 MF

R8
68 OHM

J1

+5

9 >

C7
.01 MF

6 >

5 >

4 >

8 >

7 >

1 >

2 >

KEY > 3 >

NOTE: USE J1
FOR RAPID
FIRE OPTION

J2

N.C.   9 >

6 >

5 >

4 >

8 >

7 >

1 >

2 >

KEY   > 3 >

NOTE: USE J2 TO
BYPASS
RAPID FIRE
OPTION

M051-00114-A002

| CKD. V.S. | | DO NOT SCALE DWG. | | |
| DRN. TJK | DATE 9/30/81 | USED ON   GALAGA | REVISIONS | |
| heat treat | scale FULL | NO.REQ'D   1 PER | MIDWAY MFG. CO.
FRANKLIN PK. ILL. | |
| mat'l. | | RAPID FIRE P.C. | PART NO.
A082-91410-A000 | |
| finish | | | | |

7-7

DESIGNATION LIST

DESIGNATION	DESCRIPTION	DESIGNATION	DESCRIPTION
C1	470 MF ELEC.	D1	1N914B
C2—C17	.01 MF POLY.		
C18	.1MF "	Q1	2N3391A
C19	.01 MF "	Q2	2N4403
C20	22 MF ELEC.	Q3,Q4	NOT USED
C21	220 MF "	Q5	TIP 110
C22	100 MF "		
C23,C24	.16 MF TANT.	IC 1A	74LS107
C25	10 MF ELEC.	" 1B	74LS283
C26—C29	.01 MF POLY.	" 1C	74LS174
C30,C31	.001 MF "	" 1D	PROM 2B-1
C32—C42	NOT USED	" 1E,1F,1H,1J,1K,1L,1M,1N	74LS367
C43	.0022 MF CER.	" 1P	74LS139
C44	10 MF ELEC.	" 2A,2B	7499
C45	100 PF CER.	" 2C	74LS157
C46—C65	.1 MF "	" 2D	74LS86
CX1	NOT USED	" 2E,2H,2J	06XX CUSTOM IC
CX2	100 PF CER.	" 2K	06XX "
		" 2L	74LS245
R1,R6	330 OHM 1/4w 5% CRBN.	" 2M	06XX—XONES—1XXX
R2,R4	NOT USED	" 2P	74LS393
R5	330 OHM 1/4w 5% CRBN.	" 3A	4066 CMOS
R6	1K " "	" 3B	74LS273
R7,R8	10K " "	" 3C	74LS393
R9	NOT USED	" 3D	NOT USED
R10	10M OHM 1/4w 5% CRBN.	" 3E	EPROM 2B-B
R11	22K " "	" 3H	2B-F
R12	47K " "	" 3J	2B-E
R13	100K " "	" 3K	2B-D
R14	NOT USED	" 3L	2B-C
R15	470 OHM 1/4w 5% CRBN.	" 3M	2B-B
R17	2.2K " "	" 3N	2B-A
R18	4.7K " "	" 3P	74LS32
R19	10K " "	" 4B	74LS138
R20	3.3K " "	" 4C	74LS32
R21	33K " "	" 4D	07XX CUSTOM IC
R22	220K " "	" 4E	Z—80A
R23	22K " "	" 4H	5IXX CUSTOM IC
R24	100K " "	" 4J	Z—80A
R25	4.7K " "	" 4K	74LS161
R26	10 K " "	" 4L	NOT USED
R27	22K " "	" 4M	Z—80A
R28	47K " "	" 4P	74S139
R29	4.7K " "	" 5A	74LS368
R30	10K " "	" 5B	74107
R31	22K " "	" 5C	74LS161
R32,R33	47K " "	" 5P	LM324
R34	10K " "	" 6A	74LS393
R35	150K " "	" 6B	74128
R36	33K " "	" 6C	74LS86
R37	10 K " "	" 6L	50XX CUSTOM IC
R38	3.3K " "	" 6M	54XX "
R39	2.2K " "	" 7C	M53730
R40	470K " "		
R41	22K " "	IC8 1D	16 PIN SOCKET
R42	150K " "	" 2E,2H,2J,2L	28 PIN "
R43	4.7K " "	" 2N,3E,3H,3J,3K,3L,3M,3N	24 PIN "
R44	10K " "	" 4D	28 PIN "
R45	22K " "	" 4E	40 PIN "
R46	47K " "	" 4H	42 PIN "
R47,R48	470 " "	" 4J,4M	40 PIN "
R49,R50	NOT USED	" 5A	16 PIN "
R51	10K OHM 1/4w 5% CRBN.	" 5B	14 PIN "
R52—R54	1K " "	" 6C	16 PIN "
R55	10K " "	" 6L,6M	28 PIN "
R56—R62	1K " "		
R63,R64	4.7K OHM 1/4w 5% CRBN.	XTAL 1	18.432 MHZ CRYSTAL
RX1	1K " "	SW 1	AKC-6 PB SWITCH
		SL	8 POS. DIP SWITCH
RM1—RM3	1K OHM 9 PIN SIP.	J1	CONN. R.A.HEADER 50 PIN
RM4	1K " 9 PIN "	J2	CONN. P.C.B. HEADER 3 PIN
RM5	1K " 9 PIN "		MOUNTING HARDWARE
RM6,RM7	1K " 9 PIN "		— (2)4—40 HEX NUT
RM9	NOT USED		— (2)4—40X9 SLT PAN M.S.
RM10—RM13	1K OHM 9 PIN SIP.		— (2) WSH 4 .125—250—032 FLT ST
RM14,RM15	2.2K " 9 PIN "		— (2) WSH 4 .120—250—018 EXT. ST
RM16	NOT USED		
RM17—RM20	220 OHM 9 PIN SIP.	P.C.B.	BOSCONIAN CPU BD.
RM21,RM22	2.2K " 9 PIN "		
	4.7K " 9 PIN "		
VR1	1K POT		

CROSS REFERENCE LIST

DESCRIPTION	QUAN	DESIGNATION	PART NO.
100 PF CER.	2	C45,CX2	0880-00905-0900
.001 MF POLY.	2	C30,C31	0880-00900-1100
.0022 MF CER.	1	C43	0880-00900-0800
.01 MF "	17	C2—C17,C19	0880-00900-0700
.01 MF POLY.	4	C26—C29	0880-00900-1000
.1 MF CER.	19	C18,C46—C65	0880-00900-0900
16 MF TANT.	2	C23,C24	0880-00900-1200
10 MF ELEC.	2	C25,C44	0880-00900-1700
22 MF "	1	C20	0880-00900-1100
100 MF "	1	C22	0880-00900-1500
220 MF "	1	C21	0880-00900-1400
470 MF "	1	C1	0880-00900-1300
100 OHM 1/4w 5% CRBN	1	R5	0062-11085-1XXX
330	2	R1,R2	0062-14485-1XXX
470	3	R15,R47,R48	0062-15685-1XXX
1K	15	R6,R16,R52-R54,R56-R62,	0062-17985-1XXX
		RX1	
2.2K " " "	2	R17,R39	0062-15685-1XXX
3.3K " " "	2	R20,R38	0062-ХОNES-1XXX
4.7K " " "	5	R18,R25,R29,R43,R63	0062-21105-1XXX
10K " " "	11	R7,R8,R10,R19,R26,R30,R34,	0062-22705-1XXX
		R37,R44,R51,R55	
22K " " "	6	R11,R23,R27,R31,R41,R45	0062-24305-1XXX
33K " " "	2	R21,R36	0062-25105-1XXX
47K " " "	5	R12,R28,R32,R33,R46	0062-26905-1XXX
100K " " "	2	R13,R24	0062-27505-1XXX
150K " " "	2	R35,R42	0062-28105-1XXX
220K " " "	1	R22	0062-29105-1XXX
470K " " "	1	R40	0062-30705-1XXX
220 OHM 9 PIN	1	RM18	0550-00804-1900
1K " 9 PIN	5	RM1—RM3,RM5,RM6	0550-00804-1300
1K " 9 PIN	3	RM4,RM6,RM7	0550-00804-1500
2.2K " 9 PIN	4	RM10—RM13	0550-00804-1900
2.2K " 9 PIN	4	RM17—RM20	0550-00804-1600
4.7K " 9 PIN	2	RM21,RM22	0550-00804-1700
1K POT	1	VR1	0506-00804-1300
1N914B	1	D1	0880-00801-0100
2N3391A	1	Q1	0880-00802-0200
2N4403	1	Q2	0880-00802-0100
TIP110	1	Q5	0550-00802-0300
07XX CUSTOM IC	1	ICL	0066-008CX-XAPX
07XX " "	1	" 4D	0066-006CX-XAPX
06XX " "	3	" 2E,2H,2J	0066-007CX-XAPX
50XX " "	1	" 6L	0066-012CX-XAPX
51XX " "	1	" 4H	0066-008CX-XAPX
54XX " "	1	" 6M	0066-009CX-XAPX
74LS32	2	" 3P,4C	0550-00803-0500
7499	2	" 2A,2B	0550-00803-0300
74107	1	" 5B	0550-00803-7200
74LS107	1	" 1A	0550-00803-0600
74128	1	" 6B	0550-00803-0400
74LS138	2	" 1P,2P	0550-00803-0700
74S139	1	" 4P	0550-00803-0900
74LS139	1	" 4B,6C	0550-00803-0800
74LS151	2	" 4K,5K	0550-00803-1000
74LS157	1	" 2C	0550-00803-1100
74LS158	1	" 2D	0550-00803-1200
74LS174	1	" 1C	0550-00803-1300
74LS245	1	" 2M	0550-00803-1400
74LS209	1	" 3C	0550-00803-1500
74LS273	1	" 3B	0550-00803-1600
74LS283	1	" 1B	0550-00803-1700
74LS367	8	" 1E,1F,1H,1J,1K,1L,1M,1N	0550-00803-1800
74LS368	1	" 5A	0550-00803-1900
74LS393	1	" 6A	0550-00803-2000
LM324	1	" 5P	0550-00803-0800
M53730	1	" 7C	0066-188XX-XX4X
4066 CMOS	1	" 3A	0508-00803-3300

DESCRIPTION	QUAN	DESIGNATION	PART NO.
PROM 2B-1	1	IC 1D	0880-00905-3100
		" 6C	0880-00905-3200
EPROM 2B-A	1	" 3N	0880-00905-2300
" 2B-B	1	" 3M	0880-00905-2400
" 2B-C	1	" 3L	0880-00905-2500
" 2B-D	1	" 3K	0880-00905-2700
" 2B-E	1	" 3J	0880-00905-2700
" 2B-F	1	" 3H	0880-00905-2800
" 2B-G	1	" 3E	0880-00905-2900
STATIC RAM 2KX8	1	" 2M	0880-00905-3000
Z—80A	3	" 4E,4J,4M	0880-00905-2200
14 PIN SOCKET	1	IC8 5B	0550-00904-0600
16 " "	3	" 1D,5A,5C	0550-00904-0700
24 " "	8	" 2N,3E,3H,3J,3K,3L,3M,3N	0550-00904-0400
28 " "	7	" 2E,2H,2J,2L,4D,6L,6M	0550-00904-0300
40 " "	3	" 4E,4J,4M	0550-00904-0800
42 " "	1	" 4H	0550-00904-0700
18.432 MHZ CRYSTAL	1	XTAL1	0550-00804-1100
AKC—6 PB SWITCH	1	SW1	0550-00804-1600
8 POS DIP SWITCH	1	DIPSW1,DIPSW2	0550-00804-1400
CONN. R.A. HEADER 50PIN	1	J1	0550-00804-0900
CONN. PCB HEADER 3 PIN	1	J2	0017-0002)-0445
MOUNTING HARDWARE			
4-40 HEX NUT	2		0017-00103-0002
4-40X9 SLT PAN M.S.	2		0017-00101-0510
WSH 4 .125-250-032 FLT.ST	2		0017-00104-0068
WSH 4 .120-250-018 EXT. ST.	2		0017-00104-0071
		MSC7C	
		"	
		"	
BOSCONIAN CPU PC.	1		A080-91412-B660

PROJECT ENG: J. SZERSZEN

MIDWAY MFG. CO. FRANKLIN PK. ILL.

USED ON BOSCONIAN

BOSCONIAN CPU BD.
A084-91412-B660
ASS'Y DRWNG.

PART NO. M051-00550-B010

DESIGNATION LIST

DESIGNATION	DESCRIPTION
C I	470 MF ELEC.
C 4	.022 MF POLY.
C5,C6	.0047 MF
C 7	.001 MF 100V 10% POLY
C8,C9	.001 MF 50V 10% POLY
CI0-C45	.I MF CER.
C46	220 PF MICA.
C47	.001 MF 50V 10% CER.
C48	100 PF. CER.
R I	220 OHM I/4w 5% CRBN.
R 2	470 " " " "
R 3	220 " " " "
R 4	470 " " " "
R 5	I K " " " "
R 6	220 " " " "
R 7	470 " " " "
R 8	I K " " " "
R II	10K " " " "
R 12	22K " " " "
R 13	47K " " " "
R14,R15	100K " " " "
R 16	22K " " " "
R 17	33K " " " "
R 18	47K " " " "
R 19	I K " " " "
R 20	100 " " " "
R21-R31	I K " " " "
R 32	330 " " " "
RM I-RM 4	2.2 K OHM 9 PIN SIP.
RM 5, RM 6	I K " " " "
RM 7	470 " " " "
RM 8-RM IO	I K " " " "
RM II	I K 5 PIN "
Q1,Q2	2N3391A
IC IB	74LS259
" IC	74LS138
" ID	74LS377
" IE,IH	PHAN. RAM 2K X 8
" IJ, IK	74LS374
" IM	O6XX CUSTOM IC
" IN	50XX " "
" IR	O7XX " "
** " 2B	RAM KIT B OPTION I
" 2C	74LS163
" 2D	PROM BS-3
" 2F,2H	74LS245
" 2J,2K,2L,2M	74LS283
" 2N	74LS244
" 2P	74LS257
" 2R	PROM BS-4
** " 3A,3B	RAM KIT B OPTION 2
" 3C,3D,3E,3F	74LS163
" 3H	74LS283
" 3J	74LS20
" 3K	74LS283
" 3L,3M	74LS86
" 3N	74LS20
" 3P	74LS86
" 3R	74LS174
" 4B	74LS138
" 4C	74LS365
" 4C	74LS273
* " 4D,4E,4F,4H	RAM KIT A OPTION 2
" 4J	O3XX CUSTOM IC
" 4K	74LS377
" 4M	PROM BS-5
" 4L	O3XX CUSTOM IC
" 4P	74LS368
" 5A	PHAN. PAL BS-8
" 5B	O5XX CUSTOM IC
" 5D	EPROM BS-P
" 5E	" BS-N

DESIGNATION	DESCRIPTION
IC 5F,5H	74LS174
" 5K	NOT USED
" 5L	EPROM BS-L
" 5M	" BS-K
" 5N	" BS-J
" 5R	52XX CUSTOM IC
" 6B	PROM BS-6
" 6C,6D	74LS194
" 6E	74LS86
" 6F,6H	74LS157
" 6J	74LS86
" 6K	74LS175
" 6L	74LS08
" 7C	74LS157
" 7D	74LS174
" 7E	74LS00
" 7F	74LS08
" 7H	PROM BS-7
" 7J	74LS175
ICS IE	24 PIN SOCKET
" IH	28 PIN "
" IM	28 PIN "
" IN	18 PIN "
" IR	16 PIN "
" 2D	16 PIN "
" 2R	16 PIN "
" 4K	18 PIN "
" 4N	16 PIN "
" 5A	18 PIN "
" 5B	20 PIN "
" 5D	24 PIN "
" 5E	" "
" 5L	" "
" 5M	" "
" 5N	" "
" 5R	42 PIN "
" 6B	16 PIN "
" 7H	" "
PCMHI-PCMH4	
J1	50 PIN RT. ANGLE
J2	6 PIN MNL. CONN.
CABLE ASSY	AS BELOW
P1, P2	PLUG-SOCKET CONNECTOR 50-PIN
CABLE	RIBBON CABLE - 33FT 50-CONNECTOR
	28 GA. STRND. RND. CONDUCTOR
A080-91413-B550	BOSCONIAN P.C.B.
	DUAL LOCKING SPACERS

CROSS REFERENCE LIST

DESCRIPTION	QUAN.	DESIGNATION	PART NO.
100 PF CER.	I	C48	0550-00800-0900
220 PF MICA.	I	C46	0550-00800-2000
.001 MF 10V POLY.	I	C7	0550-00800-2100
.001 MF 100V 10% POLY.	2	C8,C9,C47	0550-00800-2400
.0047MF POLY.	2	C5,C6	0550-00800-2200
.022 MF "	I	C4	0550-00800-2300
.I MF CER.	36	CI0-C45	0550-00800-2500
470 MF ELEC.	I	C I	0508-00800-1500
100 OHM I/4w 5% CRBN	I	R20	0062-11083-IXXX
220 " " " "	3	R1,R3,R6	0062-13383-IXXX
330 " " " "	I	R32	0062-14483-IXXX
470 " " " "	3	R2,R4,R7	0062-15683-IXXX
I K " " " "	14	R5,R8,R19,R21-R31	0062-17983-IXXX
10K " " " "	I	R11	0062-22783-IXXX
22K " " " "	2	R12,R16	0062-24583-IXXX
33K " " " "	I	R17	0062-25183-IXXX
47K " " " "	2	R13,R18	0062-25983-IXXX
100K " " " "	2	R14,R15	0062-27583-IXXX
470 OHM 9 PIN SIP	I	RM7	0550-00804-2400
I K " " " "	I	RM5,RM6,RM8-RM10	0550-00804-2100
I K 5 PIN "	I	RM11	0550-00804-2000
2.2K " 9PIN "	4	RM1-RM4	0550-00804-2200
2N3391A	2	Q1,Q2	0550-00802-0400
O3XX CUSTOM IC	2	IC 4K,4N	0066-010CX-XAPX
05XX " "	I	" 5B	0066-004CX-XAPX
06XX " "	I	" 1M	0066-005CX-XAPX
07XX " "	I	" 1R	0066-006CX-XAPX
50XX " "	I	" 1N	0066-012CX-XAPX
52XX " "	I	" 5R	0066-013CX-XAPX
74LS00	I	IC 7E	0550-00803-3400
74LS08	2	" 6L,7F	0550-00803-3600
74LS20	2	" 3J,3N	0550-00803-3600
74LS86	5	" 3L,3M,3P,6E,6J	0550-00803-3700
7489	I	" 2E	0550-00803-3300
74LS138	2	" 1C,3B	0550-00803-3800
74LS157	3	" 6F,6H,7C	0550-00803-3900
74LS163	5	" 2C,3C,3D,3E,3F	0550-00803-7100
74LS174	4	" 4A,5F,5H,7D	0550-00803-4000
74LS175	2	" 6K,7J	0550-00803-7000
.4LS194	2	" 6C,6D	0550-00803-6900
74LS244	I	" 2N	0550-00803-6800
74LS245	2	" 2F,2H	0550-00803-4100
74LS257	I	" 2P	0550-00803-4200
74LS259	I	" 1B	0550-00803-4300
74LS273	I	" 4C	0550-00803-4400
74LS283	6	" 2J,2K,2L,2M,3H,3K	0550-00803-4500
74LS365	I	" 4B	0550-00803-4600
74LS368	I	" 4P	0550-00803-4700
74LS374	2	" 1J,1K	0550-00803-6700
74LS377	2	" 1D,4L	0550-00803-4800
PROM BS-3	I	IC 2D	0550-00803-5500
" BS-4	I	" 2R	0550-00803-5600
" BS-5	I	" 4M	0550-00803-5700
" BS-6	I	" 6B	0550-00803-5800
" BS-7	I	" 7H	0550-00803-5900
PHAN. PAL BS-8	I	" 5A	0550-00803-6600
EPROM BS-J	I	" 5N	0550-00803-4900
" BS-K	I	" 5M	0550-00803-5000
" BS-L	I	" 5L	0550-00803-5100
" BS-N	I	" 5E	0550-00803-5200
" BS-P	I	" 5D	0550-00803-5300
PHAN RAM 2K X8	2	" IE,IH	0550-00803-5400

DESCRIPTION	QUAN.	DESIGNATION	PART NO.
PHAN. RAM A OPTIONS	I		0550-00803-6000
* RAM KIT A OPTIONS I	I	IC 4J	0550-00803-6200
" " " " 2	4	" 4D,4E,4F,4H	0550-00803-6300
PHAN. RAM B OPTIONS	I		0550-00803-6100
** RAM KIT B OPTIONS I	I	IC 2B	0550-00803-6400
" " " " 2	2	" 3A,3B	0550-00803-6500
16 PIN SOCKET	5	ICS-2D,2R,4M,6B,7H	0508-00804-0700
18 PIN "	2	" 4K,4N	0508-00804-0600
20 PIN "	I	" 5A	0550-00804-2300
24 PIN "	8	" IE,IH,5B,5D,5E,5L	0508-00804-0500
		" 5M,5N	
28 PIN "	3	" IM,IN,IR	0508-00804-0400
42 PIN "	I	" 5R	0508-00804-1900
6 PIN MNL. CONN.	I	J2	0017-00021-0424
50 PIN RT. ANGLE CONN.	I	J1	0508-00804-0800
DUAL LOCKING SPACERS	4	PCMH1-PCMH4	0017-00042-0253
CABLE ASSY.	I		0508-00804-2200
50-PIN PLUG-SOCKET CONNECTOR	2	P1,P2	0508-00804-0900
RIBBON CABLE - 33 FT	I	CABLE	0017-00033-0346
50-CONDUCTOR 28 GA.			
STRND AND CONDUCTOR			
BOSCONIAN P.C.B.	I		A080-91413-B550

PCMH1

P2
CABLE
CABLE ASS'Y
P1

PCMH2

BOSCONIAN VIDEO
A084-91413-B550

PCMH3

PCMH4

NOTES

* NOTE: RAM KIT A WILL UTILIZE EITHER OF THE
FOLLOWING OPTIONS BUT NOT BOTH;
OPTION I—(1) 2148 LOC. 4J
OR
OPTION2—(4) 2147 LOC. 4D,4E,4F,4H

** NOTE: RAM KIT B WILL UTILIZE EITHER OF THE
FOLLOWING OPTIONS BUT NOT BOTH;
OPTION I—(1) 2148 LOC. 2B
OR
OPTION2— (2) HM2811 LOC. 3A,3B

MIDWAY MFG. CO.

BOSCONIAN VIDEO
A084-91413-B050
SCHEMATIC

M061-00550 B013

KEY 1 BETWEEN CONTACTS 5,E AND 6,F
KEY 2 BETWEEN CONTACTS 3,C AND 4,D

6 5 4 3 2 1
F E D C B A

J5   J1 M.H.   J3

J4   J2

DESIGNATION	DESCRIPTION
C1	.1 MF AX CER
C2-C5	47 PF AX CER
C6, C7	470 PF AX CER
C8-C13	100 PF AX CER
C14-C36	.01 MF AX CER
L1-L4	CHOKE 10 JUH W.W. MILLER
L5-L8	CHOKE 10 JUH W.W.
L9-L12	CHOKE ENCAP 10 JUH
J1	P.C. EDGE CONN
J2, J3	3 PIN HEADER
J4, J5	6 PIN HEADER
J1 M.H.	2 EDGE CONN. KEY
	(2) 6-32 x 10 SLOT PAN SCREW
	(2) WSH 6 .145-.250-.032
	(1) BRK T.-CONN. FIN.

DESCRIPTION	QUANTITY	DESIGNATION	PHANTOM NUMBER
47 PF 50V AX CER	4	C2-C5	0550-00800-0500
100 PF 50V AX CER	6	C8-C13	0550-00800-0100
470 PF 50V AX CER	2	C6, C7	0550-00800-0200
.01 MF 50V AX CER	23	C14-C36	0550-00800-0300
.1 MF 50V AX CER	1	C1	0550-00800-0400
10 JUH W.W. RF CHOKE MILLER	4	L1-L4	0067-021XX-XXAX
10 JUH W.W. RF CHOKE	4	L5-L8	0550-00804-0100
10 JUH ENCAP RF CHOKE	4	L9-L12	0550-00804-0200
PC EDGE CONN	1	J1	0017-00021-0418

DESCRIPTION	QUANTITY	DESIGNATION	PHANTOM NUMBER
3 PIN HEADER AMP 350429-1	2	J2-J3	0017-00021-0443
6 PIN HEADER AMP 350431-1	2	J4-J5	0017-0021-0424
PC EDGE CON KEY	2	J1MH	C017-00021-0396
6-32 x 10 SLOT PAN SCREW	2	J1MH	0017-00101-0574
WSH 6 .145-.250-.032	2	J1MH	0017-00104-0002
BRKT-CONN. FIN	1	J1MH	0866-00118-00XF

PLEASE DESTROY ALL PRINTS DATED
PRIOR TO 1-4-82

7-12

TO P.C. BOARD

J3   J1   J5

TO CABLE

J2

+5V · AUDIO RTN · +12V · COIN METER · +5V CR METER · GND · GND · GND · GND · TEST POS. · P1 SELECT · CREDIT S.W · P2 SELECT · COIN S.W. · P1 UP · P1 DOWN · P1 RIGHT · P1 LEFT · P1 FIRE · GND · GND · P2 DOWN · P2 UP · P2 RIGHT · P2 LEFT · P2 FIRE · SPKR · SPKR · "C.T GND ONLY" · GND · COMP. SYNC · GREEN · RED · BLUE

J4

NOTE:
ALL .1 + .01 ARE MF
ALL CAPS AX. CER. UNLESS
NOTED OTHERWISE
* 1.5 AMP (MILLER TYPE)
INDUCTORS

PROJECT ENG: L. DEKKER

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REVISIONS

PART NO
M051-00550-A015